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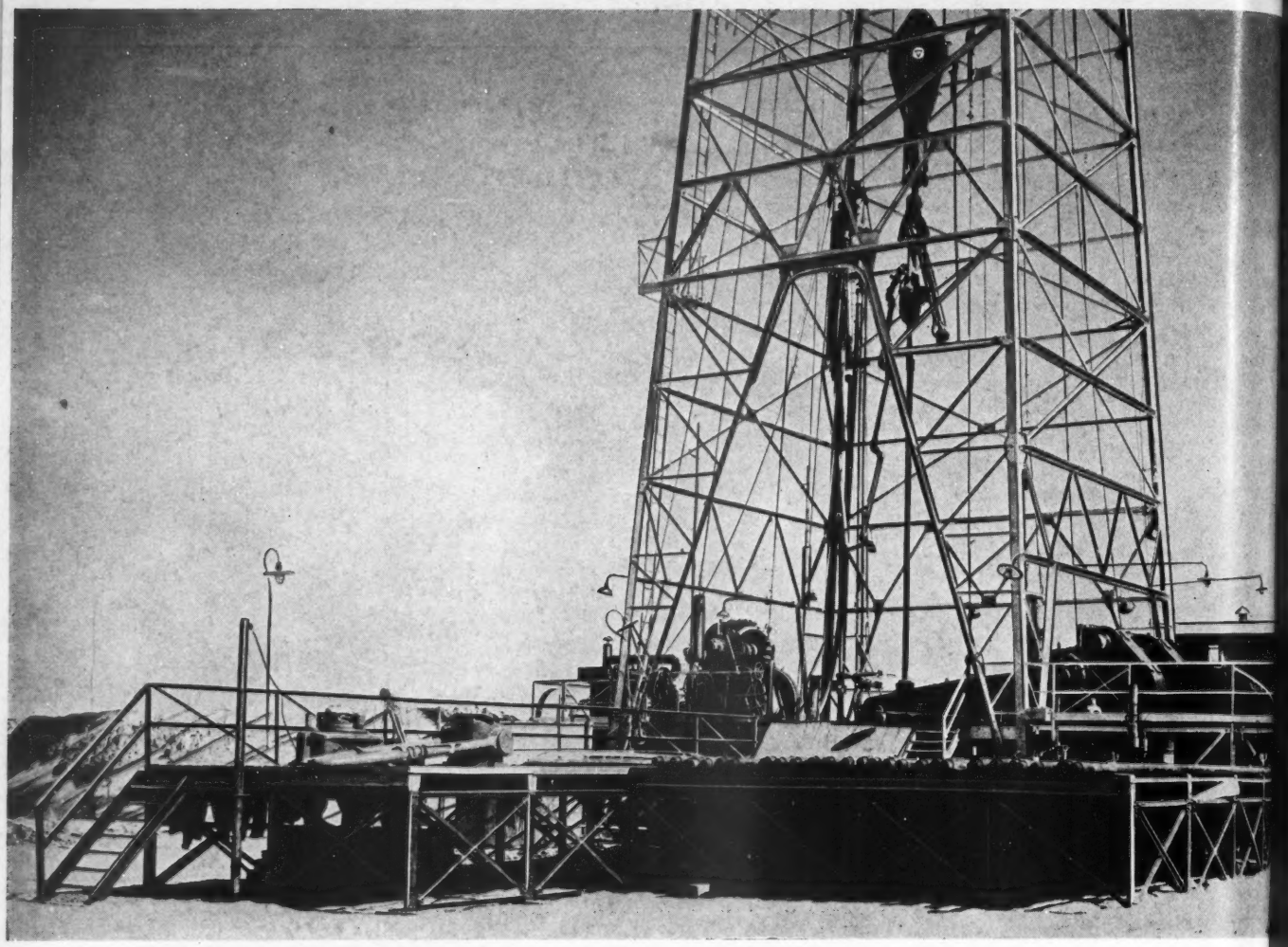

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October 27, 1938.

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Causes of Faulting and Folding on West Side of the San Joaquin Valley

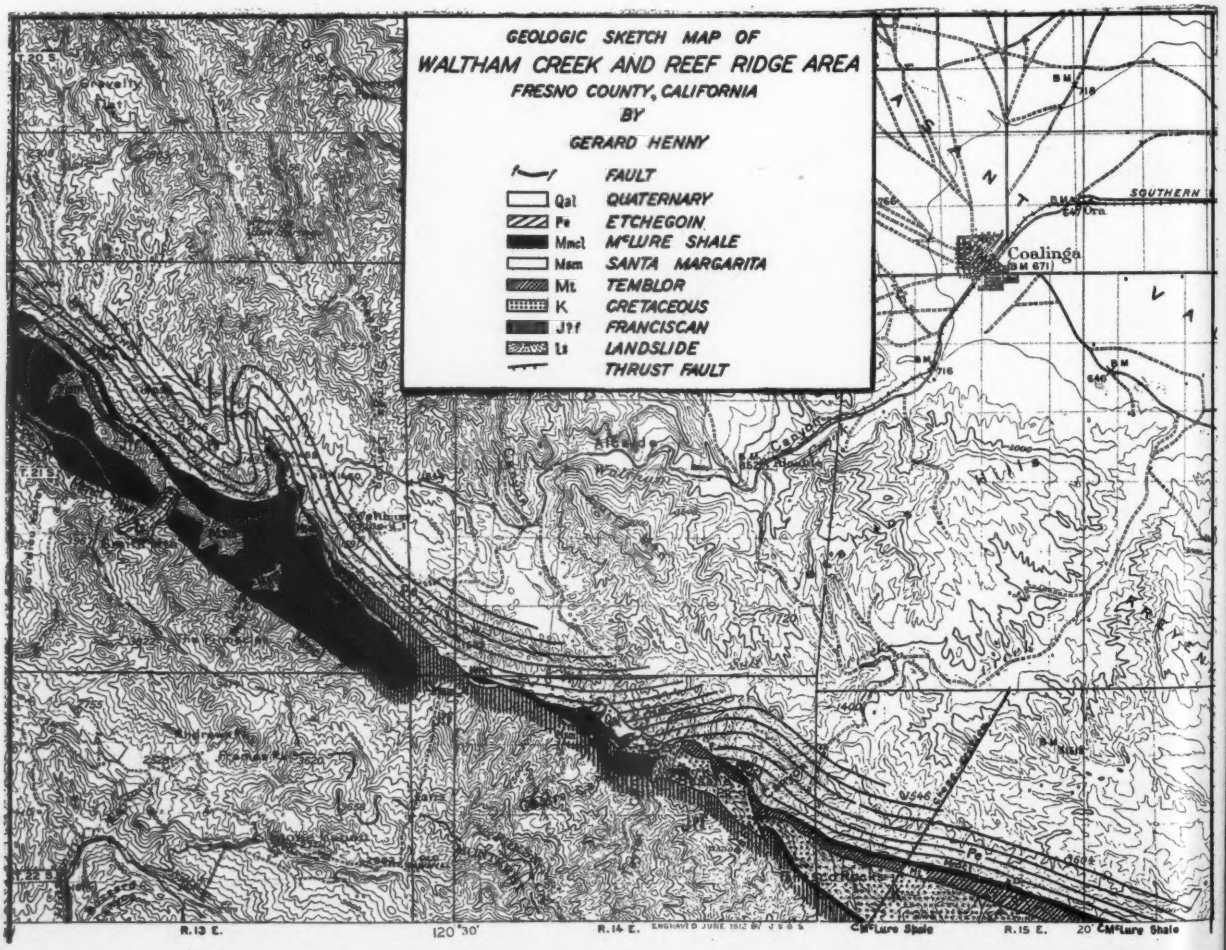
By Gerard Henny

In this article the writer will speak principally of faults and folds on the west side of the San Joaquin Valley. These faults and folds on the west side are the result of a contraction of the earth crust, while the faults on the east side of the Valley, in the Mount Poso and Round Mountain Districts, are the results of expansion.

The writer will try to explain in this article how the shape of the folds and faults are dependent on the material in which they occur. This is of great importance for the solving of structural problems. The Serpentine of the Franciscan is exceedingly plastic and slippery and is often squeezed into the faults in the same manner in which salt is forced into the salt domes and salt anticlines. The faults on the map of the Cholame Area with this article contain nearly all lenses of Franciscan rocks. They are quite curved and in contrast with the straight San Andreas Fault. This fault is also of a more recent date, it is topographically plainly visible. The other faults must have been formed before Pliocene times, as this formation lies sometimes quite undisturbed over the faults. Such an overlap exists on the Miller Flats on the line dividing the Townships 26 and 27 South, Range 17 East.

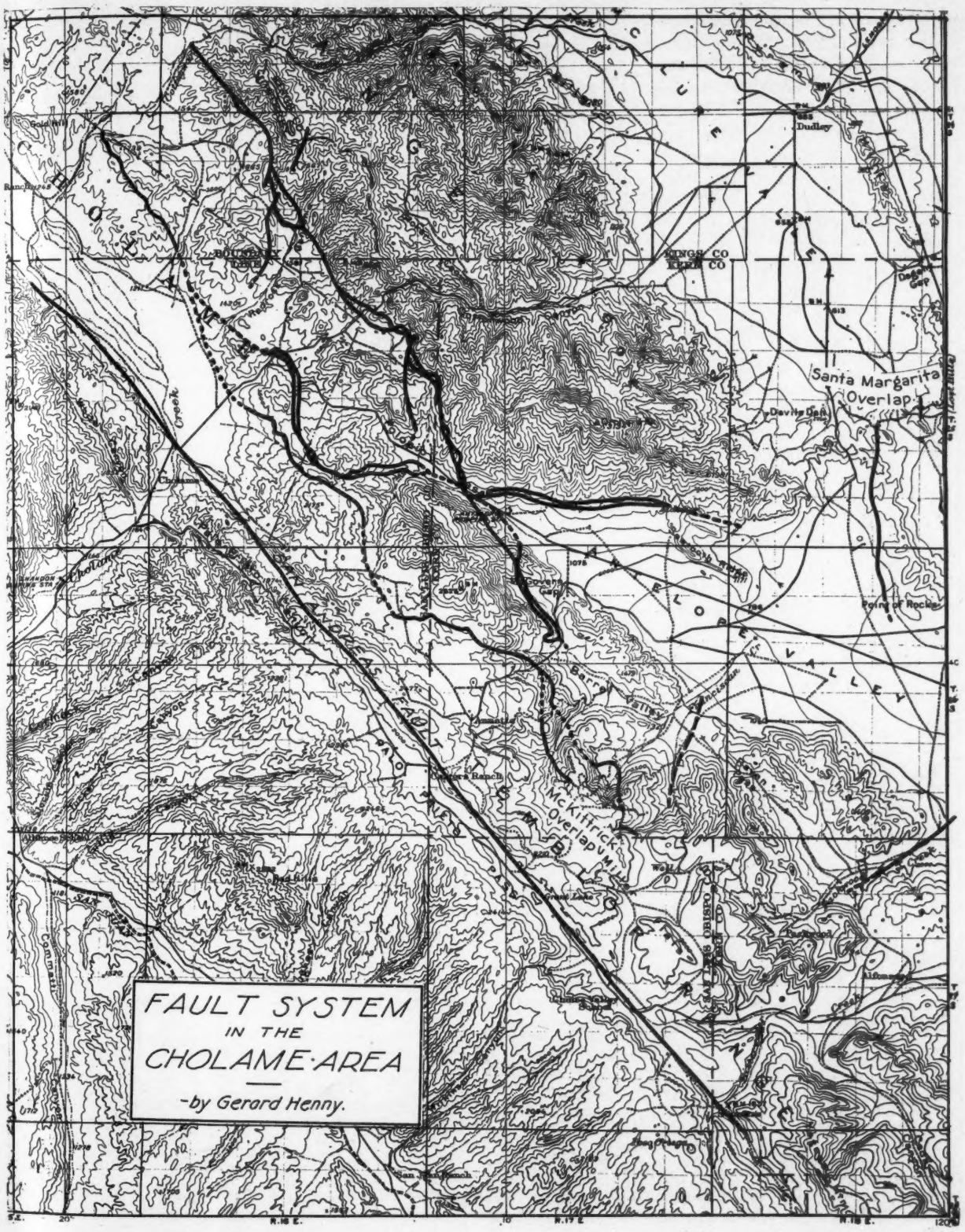
Some small rather straight cross faults cut the curved older faults in two here and there. They are necessarily of a younger age and may be the result of movements along the San Andreas Fault.

In the Coalinga District the contrast between the folding in the Franciscan and in the younger formations is very remarkable. The issue of the California Oil World of May 20th, 1938 gives a description of the geology of the Coalinga District. It shows rather broad folds in the younger formations. On the contrary a great mass of Franciscan crops out south and west of Waltham Creek and Jacalitos Creek as is shown on the sketch map with this report. Here is present a series of sharp and narrow folds in the Franciscan and the McLure Shale where the Cretaceous is entirely lacking. South of the Waltham School is a narrow anticline in the Franciscan and in the McLure Shale. This anticline goes over in north-



west direction into an overthrust fault, sometimes called the Waltham Canyon Fault.

In the southeast of the map the Cretaceous begins to appear lying on the Franciscan near Reef Ridge. Here is present a new and interesting phenomenon. In order to make clear what happened the writer has made two cross sections. One of these cross sections shows the actual geology, the other one shows



the geology during McLure times. The first section shows rather a broad anticline in the McLure Shale over a monocline series of Cretaceous. Here evidently two things have happened. First the Cretaceous was compressed by the push from the west, a push which undoubtedly existed and occasioned the forming of the coast ranges. But it slipped along the contact of the Franciscan, pinching the McLure Shale between the Franciscan and the Cretaceous. This is the only way the writer can explain the presence of the McLure Shale exactly at the contact of the Cretaceous and the Franciscan over a distance of several miles. It is also curious how the McLure Shale and the Santa Margarita sandstone are frequently found together, lying unconformably on all other older formations. Although the true age of this Santa Margarita sandstone is under discussion and although there exists frequently a decided unconformity between this formation and the McLure Shale, one can hardly admit a great difference between their ages on account of the fact already stated that they are frequently found together on older formations and principally on the Franciscan as the sections show. Such an occurrence is found in the west end of the map and on Mustang Peak as designed on the cross section. This Peak, however, is off the map to the south.

Dr. Gerard Henny

Questionnaires have been sent by the Interstate Commerce Commission to the governors of all states to get information for its probe into the need for federal regulation of truck sizes and weights.

Name E. W. Gard Union Research Head

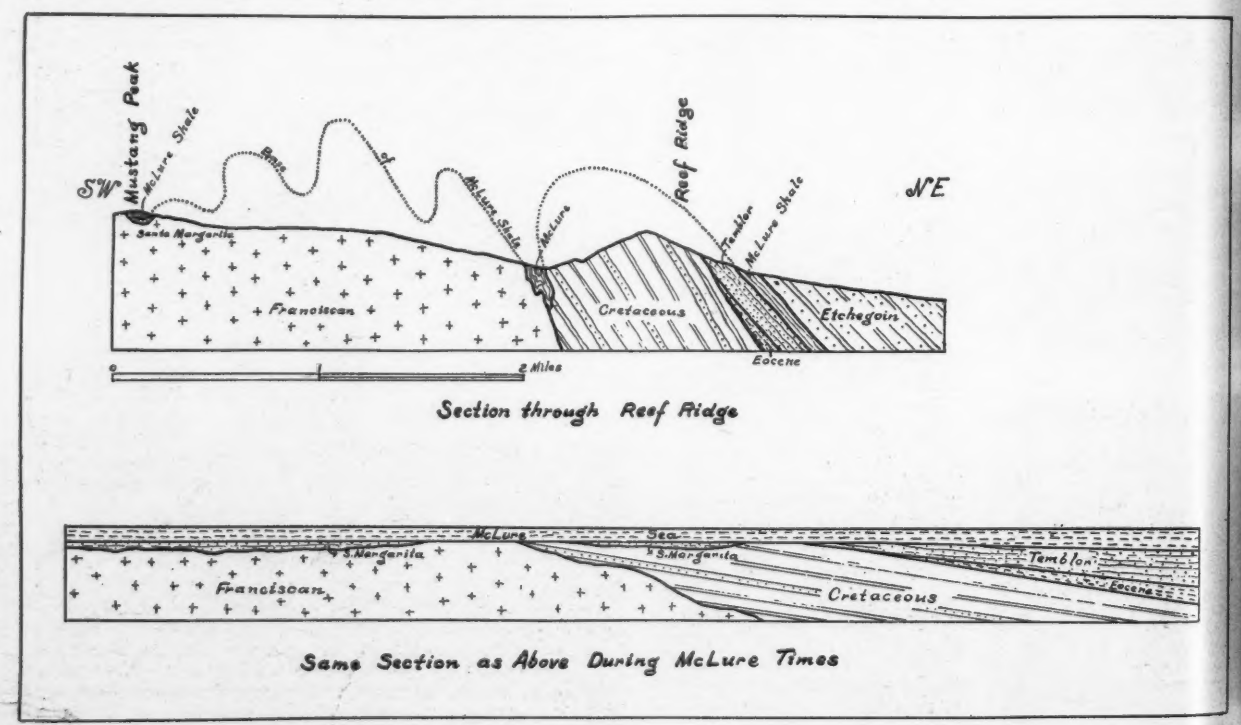
R. D. Matthews, executive vice-president of Union Oil Co. of California, announces the appointment of Earle W. Gard to the important post of director of research and development.

Mr. Gard, who has been development engineer for the company for the past eight years, is a graduate of University of Southern California, and during the war served as an engineering officer in the U. S. Navy. He has in the meantime been consistently engaged in the engineering and scientific advancement of refining practice.

For the past decade, particularly, he has been active in the development of the highly modernized processes that have almost completely revolutionized refinery operations, and has in no small measure been responsible for the specification of the unusual equipment and new type materials required by the changed technique.

In his present position, which comes in recognition of outstanding accomplishment, he is assigned responsibility for the affairs of the research, developments, and patents departments.

Employees engaged in producing petroleum in California in August 1938 increased 2.1 per cent from the number in August 1937, according to the State Division of Labor Statistics and Law Enforcement. Weekly payrolls were 3.5 per cent higher than in August 1937 and average weekly earnings were 1.4 per cent higher.



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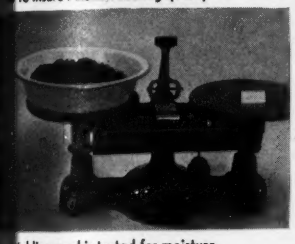
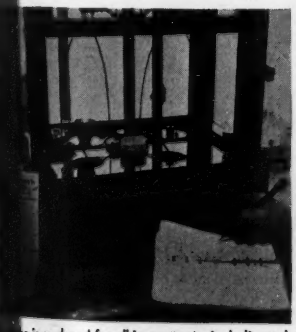


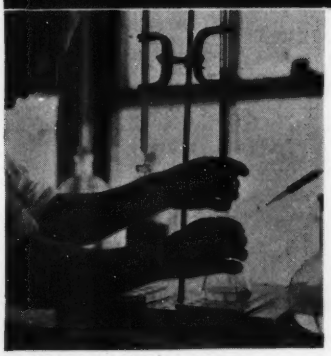
olding sand is tested for moisture.

ore sand is tested for silica content.

oke is tested for sulphur.

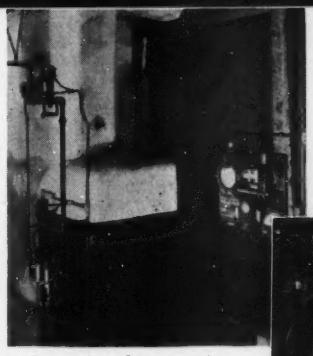


e is analyzed for all ingredients; including ash.



6. Pig iron is tested for manganese.

7. Pig iron is tested for carbon.



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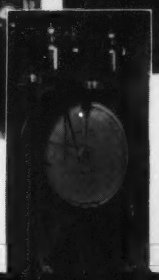
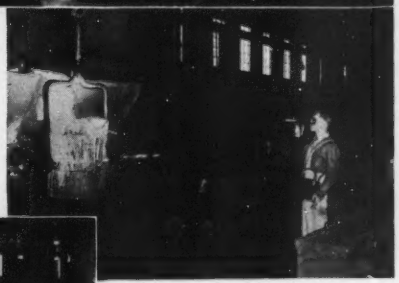


9. Even the air that enters the cupola is weighed.



10. Correct pouring temperature is determined by optical pyrometer.

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Chemical Removal of Carbonate Scale

For More Effective Oil Production

By O. N. Maness
Dowell Incorporated
Long Beach, California

The formation of calcium or magnesium carbonate deposits in oil wells which also produce quantities of reservoir water is a very old phenomenon, but it has been only in the last few years that any success has been obtained in removing chemically, these deposits from a well.

Although scale is probably precipitated back in the formation away from the bore hole, it is more noticeable and probably more harmful to production when deposited on the face of the pay or on the perforated liner opposite the producing formation.

Scale deposits are not all the same since characteristics of the well or pool greatly influence the type of deposit formed. Even in one field, deposits of entirely different structure are found.

Types of Scale

Plate 1 demonstrates this fact. Samples 1 and 2 are from two different zones of a field in the Los Angeles Basin. Number 1 is a very hard crystalline deposit free from oil. It reacts slowly with acid because of low porosity. Sample Number 2 is very porous, oil-soaked form of scale, which reacts rapidly with acid because the acid can penetrate the entire thickness of the scale.

Plate 2 is a reproduction of two different types of scale deposit found in the casing of wells in the Buena Vista Hills area of the San Joaquin Valley. Number 3 is an oil-soaked sample showing very clearly in its structure the method by which it was formed. The sample is non-porous and appears to have been built up by deposit of particles upon particles. Sample number 4, on the other hand, is not only very porous, but has the appearance of being a conglomerate. Chemical testing of this sample has shown that it contains a fair percentage of sand particles.

Plate 3 shows two types of scale removed from tubing in a Coastal field. Sample Number 6 is so porous that continuous pores through the deposit may be seen when held up to the light. Number 7 is more of a laminated deposit with small porosity. Both of these scales are saturated with oil.

Plate 4 shows how the production history of a well affects the type of scale produced. The well from which these samples were taken was drilled about thirty-five years ago and has been produced intermittently during that period. As a result, the scale is laminated. The several layers possess entirely different characteristics. In treating a well located very close to the one from which these samples were taken, 4,000 gallons of acid were used in an attempt to remove scale, but even after treatment some scale remained, thus showing that the amount of scale present in the well was enormous. It is not at all difficult to visualize the production decline that was caused by such a condition.

Effect of Scale Removal

When deposits of the nature and magnitude of those illustrated are present over the face of the formation, it is easy to understand how production can be materially decreased or completely stopped. Acid treatment of wells for the removal of scale has been improved to the point where results are definitely satisfactory.

Figures 1 and 2 show results in increased production following scale removal treatment. The well considered in Figure 1 produced four barrels of oil per day before treatment and had been producing at this rate for some time. This well was treated at a chemical service cost of $280.00. During the first sixteen days after treatment this well not only produced its four barrels a day, but also produced 272 barrels more. During the following thirty-one days the increase due to treatment amounted to 967 barrels over normal expected production. During the next thirty days the increase in production above average amounted to 415 barrels. In the first two and one-half months after treatment the well produced a total of 1542 barrels over the expected figure.

Figure 2 shows production on a well treated after the well had gone dead. As shown in this figure, production had declined very rapidly up to time of treatment. Treatment of this well with one of the weaker organic acids restored the well to steady production. In 78 days of production, the well produced over 6500 barrels of oil with an expenditure of approximately $463.00 for chemicals.

Scale Formation

The cause of scale precipitation is fairly well known. The water underlying oil in an oil reservoir probably was sea water or surface water at one time and had an opportunity to pick up carbon dioxide. The gas dissolved in the water, forming carbonic acid, H_2CO_3, as shown in equation (1). When petroleum was formed, more CO_2 was produced which was capable of migrating by diffusion through the oil until it reached the oil-

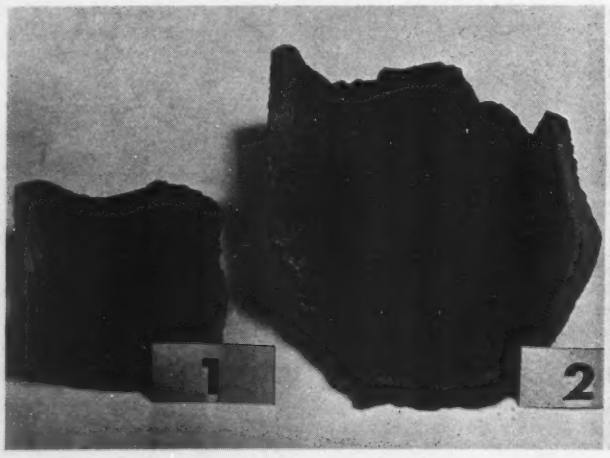


Plate 1

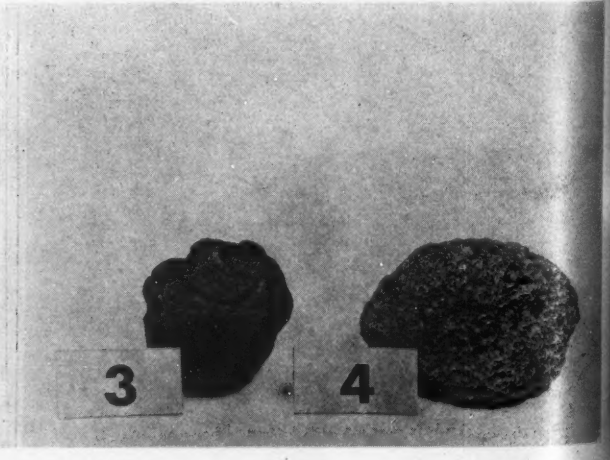
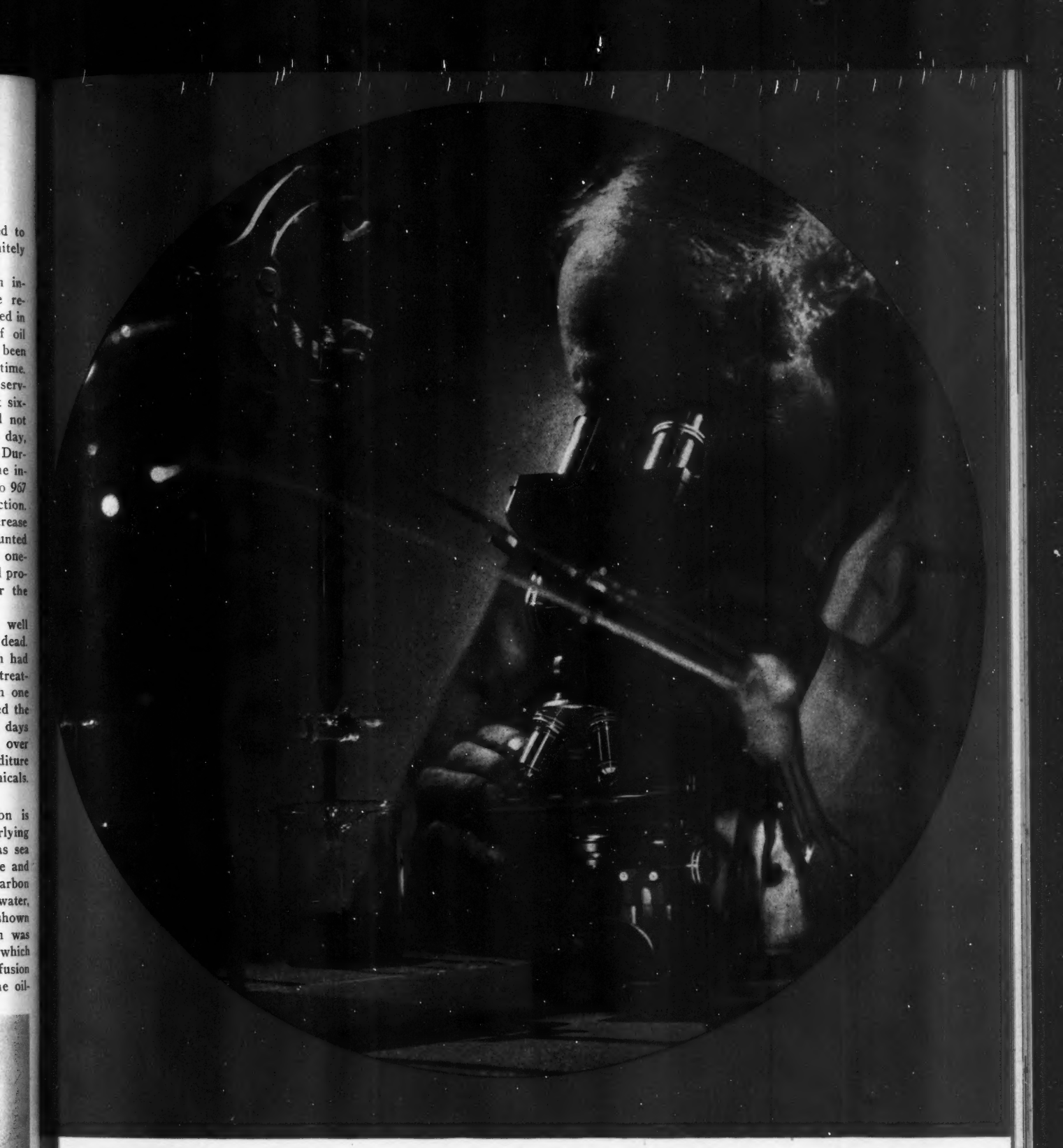


Plate 2



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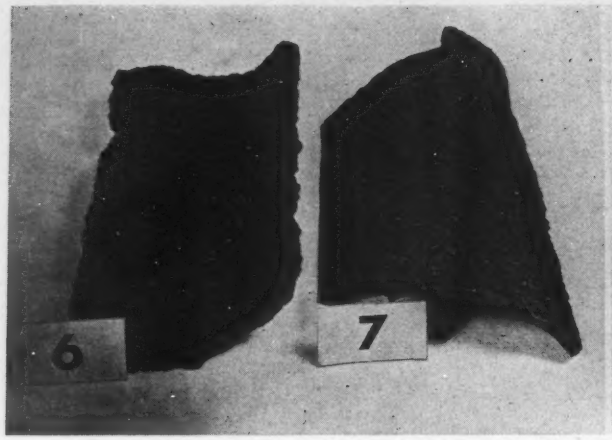


Plate 3

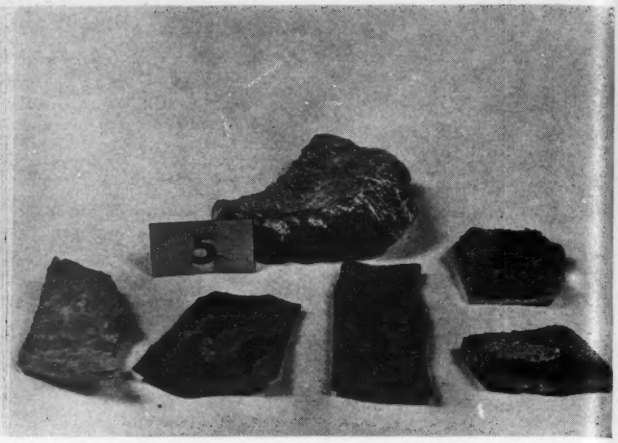


Plate 4

water interface. Here the CO_2 could enter the water inasmuch as water under pressure dissolves and holds great volumes of this gas.

Carbonic acid, H_2CO_3, is actually a weak acid and reacted with the calcium of magnesium carbonates in the formation as shown in equations (2) and (3).

$$CO_2+H_2O=H_2CO_3 \quad (1)$$
$$H_2CO_3+CaCO=Ca(HCO_3)_2 \quad (2)$$
$$H_2CO_3+MgCO_3=Mg(HCO_3)_2 \quad (3)$$

The reaction products of equations (2) and (3) are acid carbonates or bicarbonates and are much more soluble in water than the carbonates. Under stabilized pressure and temperature conditions underground these chemicals remain in solution indefinitely, but even minute changes in temperature or pressure will destroy the balance.

Johnson and Williams[1] in testing ocean waters found that a temperature drop of 2°C. changes the solubility sufficiently to cause precipitation of 2 grams of calcium carbonate from one cubic meter of saturated solution. Similar precipitation will occur if the concentration of CO_2 in the gas drops from 3.2 to 3.0 parts per 10,000.

When a well is put on production, the subsurface pressure declines and fluid begins moving into the hole. A pressure drop is experienced throughout the entire drainage area of the well, and without a pressure differential there can be no flow. When the pressure on the oil is decreased, gas tends to come out of solution. This change of state is accompanied by a temperature drop. The water underlying the oil experiences lower pressure, as does the oil, and also may be affected by the lower temperature caused by gas expansion.

Both the decrease in temperature and pressure affect the chemical equilibrium existing between water and its dissolved salts so that precipitation occurs. The temperature decrease reduces solubility of salts in water and the pressure decrease causes equation (1), (2) and (3) to reverse as shown in (4) and (5).

$$Ca(HCO_3)=CaCO_3+H_2O+CO_2 \quad (4)$$
$$Mg(HCO_3)=MgCO_3+H_2O+CO_2 \quad (5)$$

Since solubility of $CaCO_3$ is 15 parts per million whereas solubility $MgCO_3$ is 106 parts per million, the precipitate is predominately calcium carbonate.

The precipitation of these carbonates back in the formation will form barriers or dams which tend to block the movement of the water drive. A less mobile drive will result in less production. However, the greatest pressure drop during production occcurs at the face of the pay and therefore the deposit is much greater at this point. For this reason, removal of scale on the face of the pay or on the liner is the more important and will result in increased production.

Chemicals Used in Scale Removal

The chemical most widely used in scale removal is muriatic or hydrochloric acid. The preference shown for this acid is based on its low cost, the ease with which it is inhibited and the solubility of the salts produced in the reaction between the acid and scale. The calcium and magnesium chlorides and other salts produced are all soluble in the water present with the acid. The usual acid strength in scale removal treatments is 10% to 15% hydrogen chloride by weight. This percentage is preferable to stronger concentrations because of the possibility of precipitating calcium chloride if stronger acid is

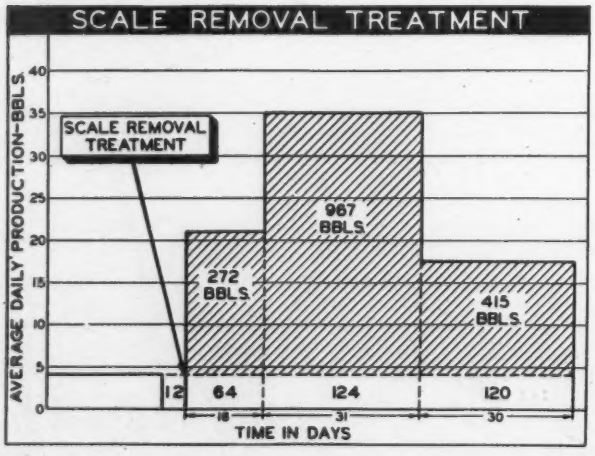


Figure 1

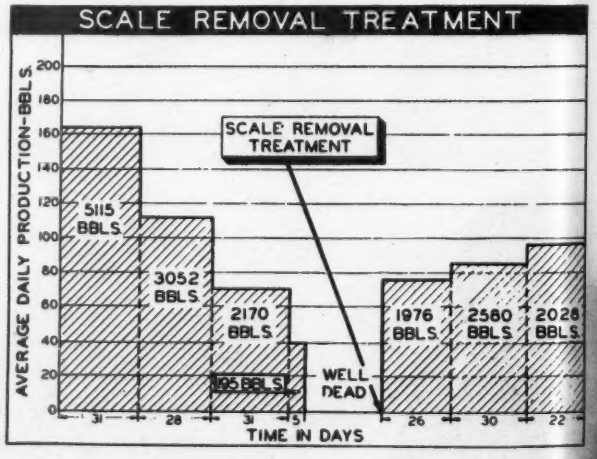
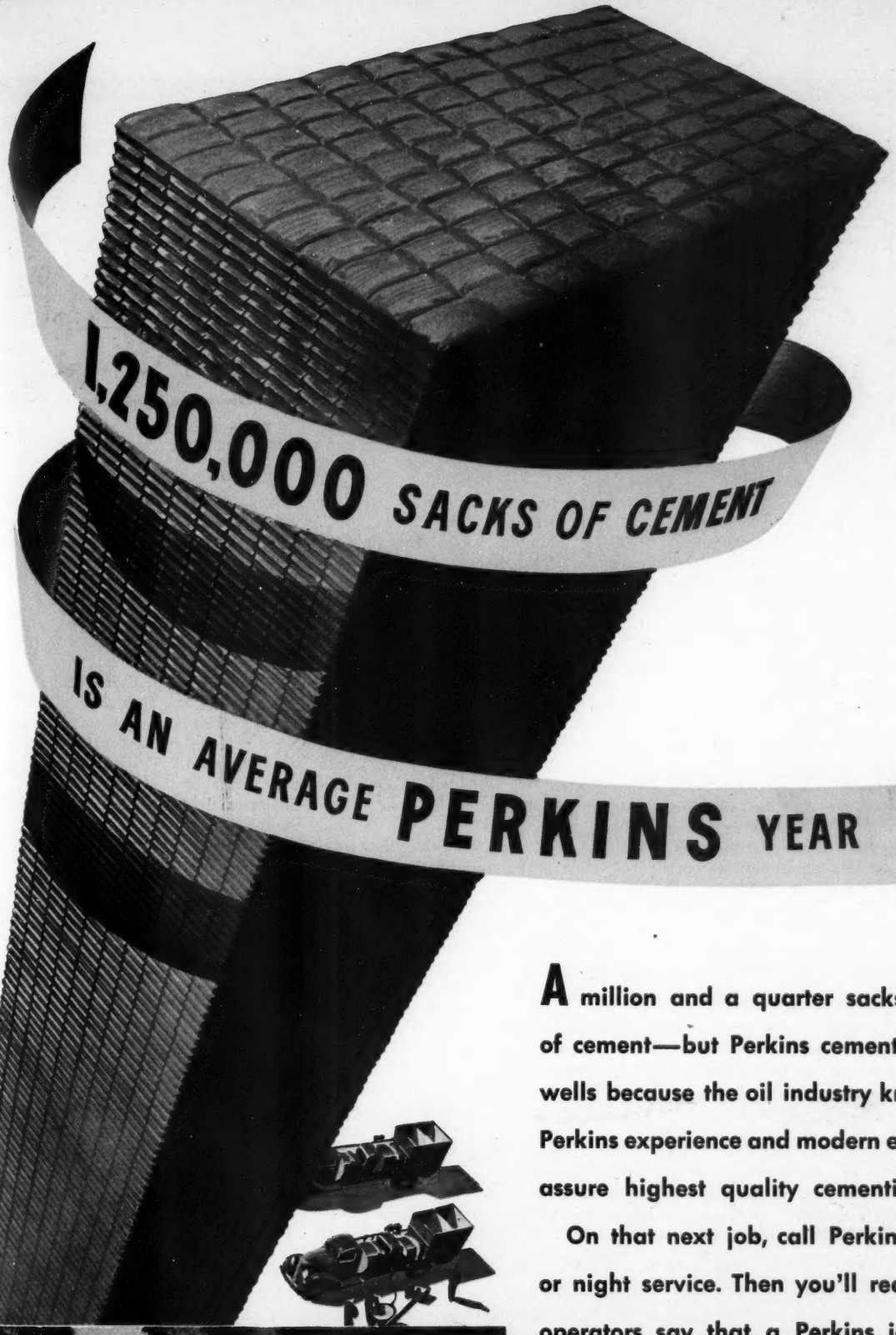


Figure 2



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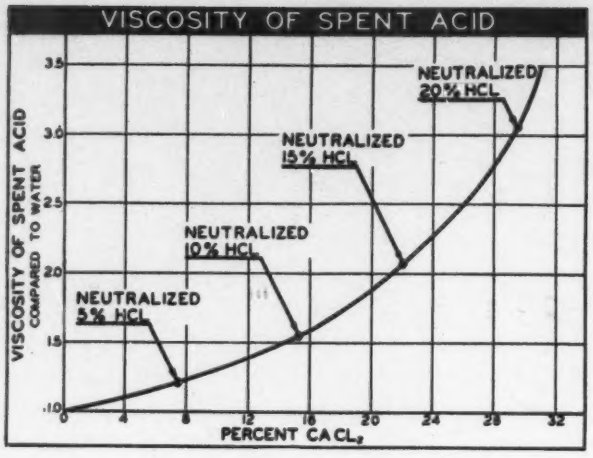


Figure 3

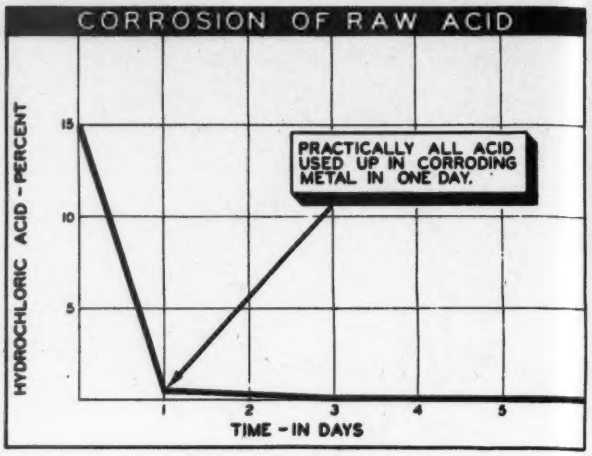


Figure 4

used, and because of the lower viscosity of the spent acid. Fifteen per cent hydrochloric acid when reacting completely with limestone will produce a 22% calcium chloride solution. The large increase in viscosity of solutions of comparatively high calcium chloride content is shown in Figure 3. It is most desirable to keep the viscosity at a low figure, since there is always the possibility that spent acid may enter the formation during or after treatment and low viscosity is desirable for easy removal of the spent acid.

Some of the weaker organic acids, such as acetic acid, may be used but the solubility of the salts resulting from reaction with the scale is relatively low, and the danger of precipitation is great. When using solutions of weaker organic acids, very low concentrations are therefore necessary, and this involves larger volumes of acid for solution of a given quantity of scale. In addition, the weaker acids are much more expensive than hydrochloric and result in a treatment cost that is entirely out of line with good economy.

In treating a well for the removal of scale, it is necessary that the acid come in close contact with metal equipment in the well. Hydrochloric acid possesses very definite corrosive power, and inhibitors are generally necessary to retard this corrosive action to the greatest possible extent.

Inhibitors are available which will reduce the corrosive action of the acid 98% or 99%, as illustrated in Figures 4 and 5.

Figure 4 shows the decrease in concentration of raw acid left in contact with an excess of iron. Figure 5 shows the results when inhibited acid is treated similarly. It will be observed that in Figure 4 practically all of the raw acid is spent in corroding iron in one day, whereas in Figure 5, where an inhibitor is employed, even at the end of six days at least 98% of the acid remains unchanged, showing that very little iron has been corroded.

These inhibitors have been designed particularly to prevent the action of hydrochloric acid on iron and high carbon steel found in tubing, rods and casing. However, special alloy steels used in pumps and pump parts present an entirely different problem. This corrosion has been termed "electrolytic" corrosion, as the presence of dissimilar metals all exposed to the acid solution produces a different type of corrosion and a greater amount of it than would be expected by calculation from the known rate of reaction between hydrochloric acid and steel. This is particularly true when high chromium content steels or chromium plated parts are present. To date, no effective means have been discovered for preventing corrosion of these special alloys, and it is recommended that such parts be removed from the well prior to treatment. This can best be handled by thoroughly discussing the preparation of the well with the service company engineers before a treatment is made.

As illustrated in the plates, most scales are oil-soaked, since they have been formed in the presence of oil. Many times, this oil is present as very heavy viscous layers. Oil is not miscible with the acid and acts as a barrier to the penetration of acid farther into the scale. For this reason, scale removal treatments in California have made use of a special additive agent used with inhibited hydrochloric acid to permit easier penetration of the acid into the scale. This agent increases the wetting power of the acid and permits acid to penetrate past the oil layers into the calcium and magnesium carbonate deposit. This wetting agent also has a tendency to prevent the formation of any emulsion or sludge between the acid and certain constituents in the oil. Figures 6 and 7 show results of rate of reaction tests using various types of acid.

Tests of the oil produced in all California fields show that only the very high gravity oils produce any appreciable amount of sludge when in contact with muriatic acid. For example, analyses of eighteen different types of oil from various fields in the San Joaquin Valley indicate that only oil from two of the high gravity fields produces sufficient sludge when in contact with acid to warrant extra precautions in treatments. Testing these two oils with some of the weaker organic acids indicates that the sludge was negligible in their presence and has led to further development work along this line.

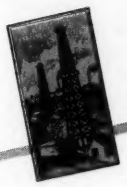
Application of Chemicals

A number of methods has been advanced for applying chemicals to a well for scale removal. In a good method it is essential that the treatment be conducted in such a way that fresh acid comes in contact with the scale for a period of time sufficient for complete reaction to take place.

One method is described by Morris[2] as "pickling." In such a treatment, acid, in quantities from one to two times the volume of the perforated section, is introduced into a well either down the tubing, with rods and standing valve removed, or down the annular space between the casing and tubing, or down the casing without any tubing present. The acid remains in the well from 12 to 24 hours and is tested periodically by bringing samples to the surface to determine whether or not all the acid has reacted.

The most serious objection to this method lies in the fact that the heavy acid has a very definite tendency to penetrate back into the formation where it can do no good and may do harm by disintegrating the bonding material in the formation and thus cause caving. This is particularly true in older wells

A year ago...



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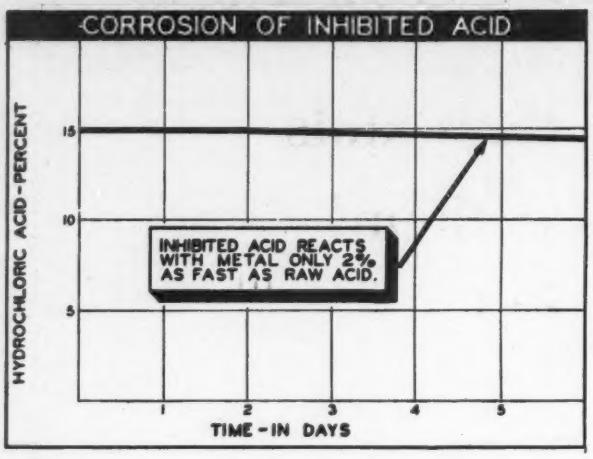

Figure 5

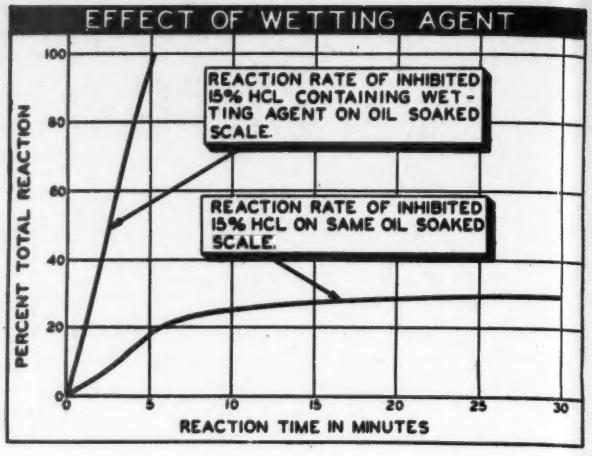

Figure 6

which have low fluid levels. Since scale is usually found only in old wells, this presents a very definite problem.

Inasmuch as a heavy acid tends to enter the formation of such old wells, it is entirely probable that in the treatment of a well with a rather thick producing section, a fluid column could not be supported suffciently to permit action between acid and scale at the top of the formation. This is particularly unfortunate since it is the experience in California that deposition of scale is greater in the upper part of the perforated section than in the lower, probably due to the escape of more carbon dioxide and a lower temperature at this point.

To overcome these possible objections, a treatment has been developed in California to remove scale efficiently and economically. The well to be treated is put on the pump, and is kept pumping until the treatment is finished. When the fluid is either pumped off or has been lowered in the well as much as possible, two hundred to three hundred gallons of inhibited hydrochloric acid, to which has usually a wetting agent, been added, are pumped very slowly through the casing head into the annular space between the tubing and casing. The acid falls down the casing and comes into contact with the scale both on the outside of the tubing and, more to the point, on the perforated section of casing or liner. As pointed out before, it is more desirable to let the fresh acid begin acting at the top of the liner, as this is where the scale deposit is usually the most prevalent.

Small acid applications are repeated at regular intervals, always spacing them sufficiently so that the acid will not build up in the hole to a great enough height to overbalance the normal fluid level of the well. In this manner, penetration of the acid into the formation is kept at a minimum.

The pump capacity can be measured very easily, and the time when the first spent acid will reach the surface of the tubing is estimated. Samples of fluid being produced from the well are taken from the lead line beginning at this estimated time and are filtered and titrated for acid concentration. If no acid is present, it is known that the acid has been completely reacted with the scale.

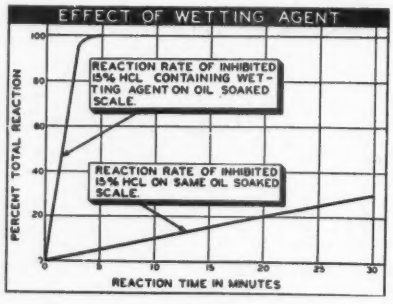

Figure 7

Samples and acid tests are made every thirty minutes. As long as the spent acid returning from the well has been completely reacted, more acid is introduced at intervals down the casing.

The introduction of acid down the casing and the testing of the spent acid coming up the tubing are continued until the spent acid, showing up at the top of the tubing, reacts slightly acid. At this time, it is known that the acid has removed most of the scale in the well. However, if the acid at the top of the tubing shows slightly acid, the solution down in the bottom of the well probably contains a greater percentage of acid. In order not to waste whatever activity remains in the chemical, the fluid in the tubing is bypassed immediately back into the casing and the well is circulated in this manner from eight to twenty-four hours. This circulation, without the addition of more chemicals to the well, results in a final clean up of all scale in the well and in complete neutralization of all chemicals.

This method permits excellent agitation of the acid in contact with the scale, resulting in much faster and more complete reaction. Spent acid completely reacted with scale is not mixed with fresh acid being introduced into the well, thereby preventing unnecessary and undesirable dilution. The normal fluid level of the well is not overbalanced, and, therefore, penetration of acid into the formation is kept at a minimum. Most important of all is the fact that, while a minimum amount of acid is used to do the job, yet the scale removal is complete!

1. Journal of Geology, Vol. 24, 1916, P. 729.
2. Morris, M. W. "Chemical Clean Out of Oil Wells in California" A. P. I. Drg. and Prod. Practice—Pacific Coast Sec. 1937.

Interesting Papers For Institute of Petroleum

The new oil fields of Illinois will be described by Theron Wasson, chief geologist of the Pure Oil Co., at the fourth annual meeting of the Institute of Petroleum, to be held Nov. 16, in Chicago. Dr. J. Bennett Hill of the Sun Oil Co. will preside.

Dr. R. C. Williams, of the Shell Development Co., will discuss "Modern Research Angles in Oil"; Dr. Gustav Egloff, Universal Oil Products Co., will speak on "Substitute Motor Fuels Over Europe."

W. B. Way, general manager of the International Petroleum Exposition, Tulsa, will tell what is to be done for the technical side of the industry at the next exposition, to be held in 1940.

Dr. Cary Wagner, Pure Oil Co., 35 East Wacker Drive, Chicago, invites reservations for the dinner meeting.

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Conservation of Gravity in Production

And Handling of Crude Oil

S. F. Mauney, Jr.* and George M. Vandaveer, Jr.†

Conservation of gravity in the production and handling of oil not only effects a saving of volatile portions, but also of volume, inasmuch as any loss in gravity of crude oil means a decrease in volume. It is, therefore, a true form of conservation. Much attention and publicity have been given to conservation of crude oil from the standpoint of supply and demand, application of more effective production methods, and the use of secondary recovery methods; whereas conservation as related to gravity has, as a general thing, been sadly neglected. Many phases of this loss have been unrecognized; and other phases, although recognized, have been considered "necessary evils." The losses that occur in producing, treating, storing, and transporting crudes are insidious in that they are not visual, and usually there is no readily-apparent nor convenient method of determining the losses. This is particularly true of losses occurring in production and in lease treating and storage.

Effect of Evaporation Losses

Spoken of in terms of percentage, the production and transportation losses seem small; but when translated into dollars, they assume an enormous figure. Schmidt[1a] states that Wiggins in 1921 estimated the average evaporation losses from well head to refinery as 6.2 per cent, and divides them as shown in Table 1.

Schmidt[1] conservatively estimates that losses from well to refinery have been cut from 6.2 per cent in 1921 to approximately 2 per cent in 1934. The authors believe that this figure is entirely too small for 1934, and even for 1938, because on many leases, by attention to treating and storage, it has been possible to save more than 2 per cent by volume. However, applying 2 per cent to the daily Mid-Continent production of 1,910,000 bbls., the loss amounts to 40,000 bbls., which at $1.22 (36-deg.-API-gravity oil) amounts to $48,800. More than 50 per cent of the losses occur on leases where gravity affects price; and the estimated evaporation loss indicates approximately an 0.4-deg. loss in gravity, which means that probably one-third of the production

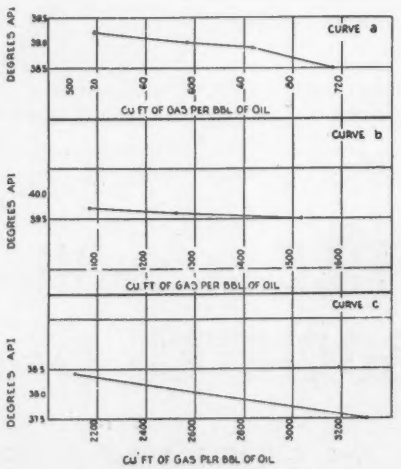
TABLE 1

Results of the 1920-31 Survey of U. S. Bureau of Mines Showing Average Evaporation Losses of Crude Petroleum in the Mid Continent Field

Location of Loss	Average Per Cent Evaporated
Flow tank	1.0
Filling lease tanks	1.0
Lease storage	1.5
Gathering systems	1.0
Transportation	1.0
Tank farms	0.7
Total	6.2

is changed to a lower-gravity bracket—thereby losing 2 cents a barrel in price. This amounts to a further daily loss to Mid-Continent producers of $6,400 which added to the value of the volume loss, makes a total daily estimated loss of $55,200. This estimated value does not represent the true loss, as the portion evaporated is gasoline—which is much more valuable than the average price for crude indicates. And, too, these estimated losses are not the only ones to be considered, as some material losses occur with certain methods of production such as gas-lift, flowing with high gas-oil ratio, etc.

Schmidt[1] states that lease losses could be cut below 1 per cent by using properly-maintained and efficiently-operated tankage, but that only approximately 50 per cent of the decrease in evaporation loss is realized by the operators because of poor use of the provided equipment. The recognition of these losses and application of common-sense methods can result in enormous savings compared with the amount expended, inasmuch as generally the first cost is the last cost in much of the gravity conservation work.



Gas-Oil Ratio and Gravity Relationships.

FIG. 1

Maintaining Gravity in Crude

As mentioned above, certain methods have a direct and/or indirect effect on the gravity of the produced oil. In some instances losses caused by production methods are partly recovered in gasoline plants; but considering the cost of this recovery, the nearness of the sales price of natural gasoline to crude, the increased transportation cost for the gasoline, and the greater evaporation loss occurring on the more volatile fluid, it is generally more profitable to retain as much gravity, with consequent connected volume, in the crude as possible.

Effect of Low Gas-Oil Ratio

In natural flowing wells some control can generally be exercised over the rate of flow and the consequent gas-oil ratio. It is naturally very much in the interest of conservation to obtain as low a gas-oil ratio as possible for reasons other than conservation of gravity. However, gravity conservation goes hand in hand with low gas-oil ratios, as shown in Fig. 1. These values were determined by tests on three wells in the Fitts Field, and the curve shows values obtained in each well by changing the rate of flow with the consequent change in gas-oil ratio and gravity. Curves **a** and **b** are values determined from tubing flow, while curve **c** was determined from casing flow. With the fact in mind that lower gas-oil ratios mean higher gravity in any given well, it can be seen how additional conservation can be accomplished through the correct method of production.

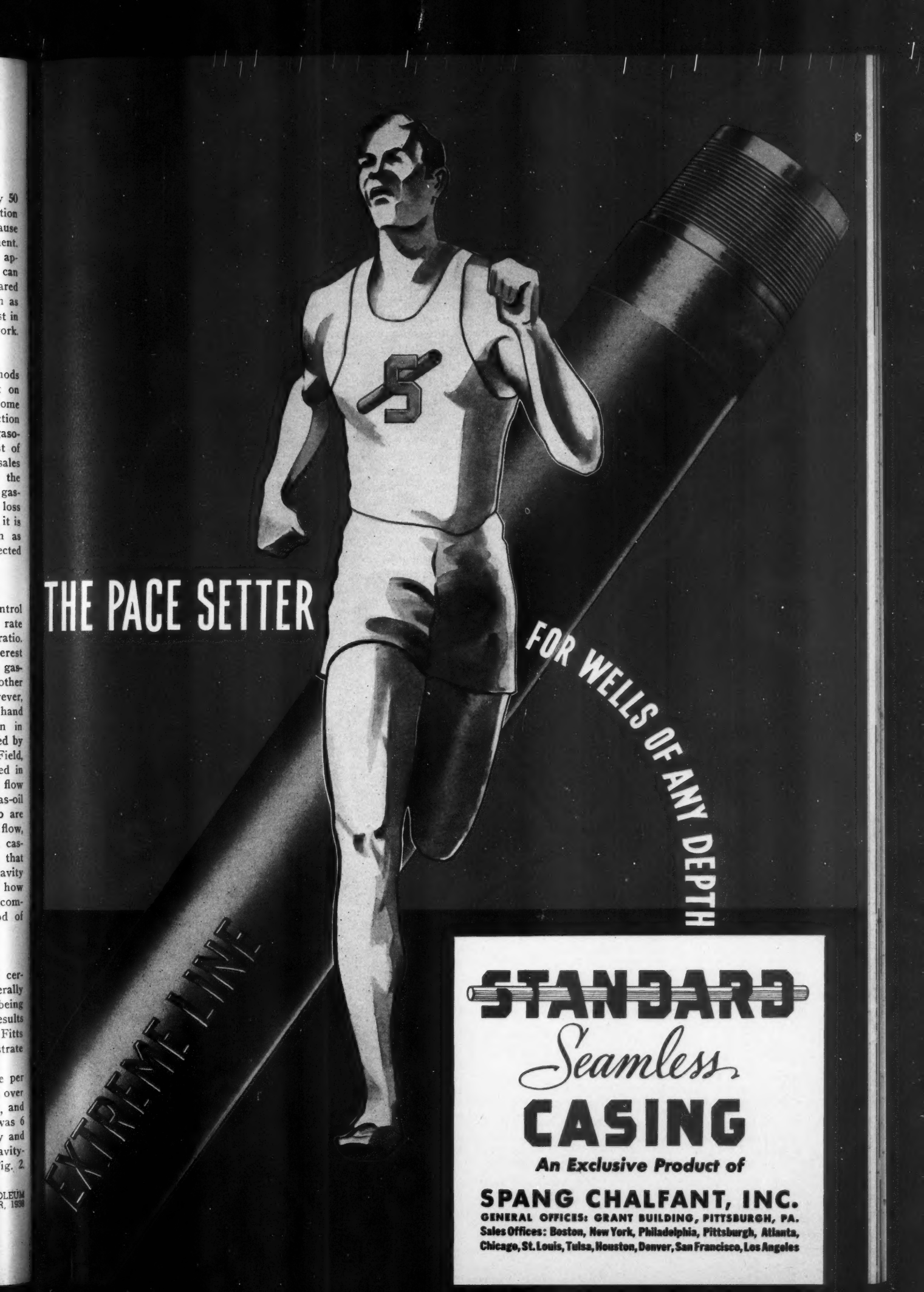
Back-Pressure Maintenance

Maintaining back pressure up to certain points on separators will generally result in crudes of higher gravity being delivered to the pipe lines. The results of some experiments made in the Fitts Field, and shown in Table 2, illustrate this.

On lease "A," the increased value per barrel for the 30-lb. separator oil over the 15-lb. separator oil was 5 cents, and on lease "B" the increased value was 6 cents, which was due to the gravity and related volume saving. The gravity-volume relationship is shown in Fig. 2

*The Carter Oil Co., Seminole, Okla.
†E. H. Moore, Inc., Tulsa, Okla.
[a]Figures refer to bibliography on p. 13.

Paper Presented at Eighth Mid-Year Meeting, American Petroleum Institute, Wichita, Kans., 5-24-38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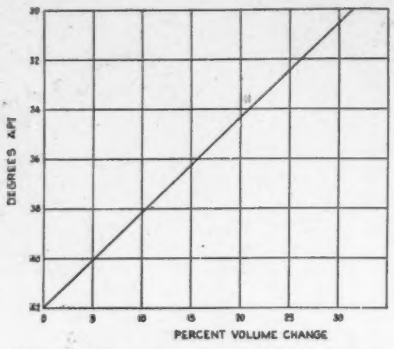
Effect of Gas- or Plunger-Lift

Producing oil by gas-lift or plunger-lift always results in considerable loss of gravity, however, this is usually partly regained at some expense by processing the gas at a gasoline plant. Examination of considerable data, comparing



2.6 per cent decrease in volume per 1 deg. API decrease in gravity; average of crudes examined which had gravities from 30 to 42 deg API.

Average Relationship of Gravity and Volume Loss of Mid Continent Crudes.

FIG. 2

gravity of oil produced by natural flow and gravity obtained from the same wells after gas-lift or plunger-lift was substituted, shows a general decrease from 1½ to 2 deg. API gravity.

Effect of Water and Emulsion

Entrance of water into wells has a marked effect on gravity of oil, regardless of the method of production, due to the formation of emulsions which have to be treated—with resultant evaporation. Water produced in natural flowing wells usually has a greater effect on loss of gravity than in pumping wells, because the emulsions formed in flowing wells are generally "tighter" and, therefore, require higher treating temperatures. The percentage of water produced has a marked effect on the amount and "tightness" of the emulsion. Roberts[2] discovered that, in agitating oil and water together with the water content, less than 25 per cent resulted principally in a dispersion of water droplets in oil; with 25 to 31 per cent water, either type of dispersion; and above 31 per cent water, principally oil-in-water dispersion. Therefore, with no colloids present to stabilize oil-in-water dispersions (usual condition in crudes) the amount of emulsion formed with 31 per cent, or more, of water present is relatively small and is usually loose in mixture.

A survey made by Salnikov[3] in the Seminole area in 1932 found the general relationship of crude gravity to method of production as shown in Table 3.

The condition and the type of flowing and pumping equipment have a considerable effect on the type and amount of emulsion formed—hence, indirectly influencing the gravity of the crude. Repair of leaky pumps and removal of constrictions that cause extreme agitation can prevent or decrease formation of emulsions. The use of bottom-hole chokes or the separation of water in high-pressure knockouts before passage through surface chokes can materially reduce or prevent the formation of emulsions. The use of "down-the-hole" treating in many instances decreases, and/or causes the emulsion to be of a type that is easier to treat.

TABLE 3

Method of Production	Gravity at 60 Deg. F. (Deg. API)
Pumping well not producing water.....	41 and above
Natural flowing well producing no water..	38 to 40
Gas-lift wells producing no water.....	37 to 38
Gas-lift wells producing water and emulsions, heat- and chemically-treated.....	34 to 37
Pumping wells producing water and emulsions, heat- and chemically-treated.....	38 to 40

TABLE 2

Effect of Pressure on Separators on Gravity of Fitts Crude

(Producing Conditions as Nearly Alike as Possible to Maintain. Tanks Were All Low, Bolted, 500-Bbl.)

Date	Time	Sample	Observed API Gravity (Deg.)	Temperature of Oil (Deg. F.)	Gravity Corrected at 60 Deg. F. (Deg. API)
		LEASE "A"			
		15-Lb. Separator			
12-21-36	5 p. m.	Separator	38.6	54	39.1
12-21-36	12 p. m.	Stock tank (shut off)	38.6	52	39.2
12-22-36	8 a. m.	Stock tank	38.4	53	38.9
		30-Lb. Separator			
12-22-36	5 p. m.	Separator	39.8	58	40.0
12-22-36	12 p. m.	Stock tank (shut off)	39.6	56	39.9
12-23-36	8 a. m.	Stock tank	39.4	56	39.7
		LEASE "B"			
		15-Lb. Separator			
12-21-36	12 p. m.	Separator	37.8	50	38.5
12-22-36	7.30 a. m.	Stock tank (shut off)	37.6	53	38.1
12-22-36	1 p. m.	Stock tank	37.4	57	37.6
		30-Lb. Separator			
12-22-36	12 p. m.	Separator	38.6	54	39.1
12-23-36	7.30 a. m.	Stock tank (shut off)	38.6	57	38.8
12-23-36	1 p. m.	Stock tank	39.1	64	38.8

Lease Treating and Storage

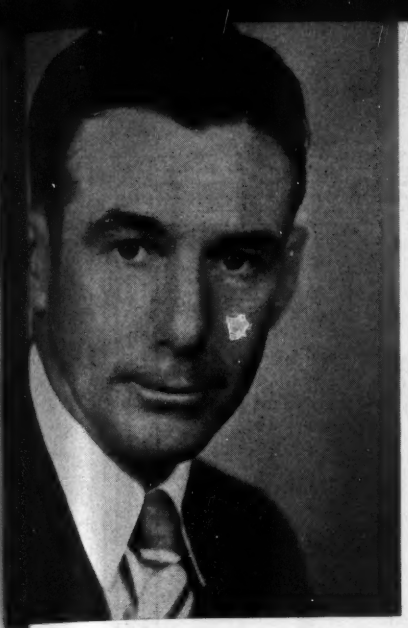
Although some preventable evaporation losses are occasioned by certain methods of production, the principal preventable losses occur in lease treating and storage. One of the most successful means for accomplishing this work has been through the employment of full-time treating engineers. These engineers—acting in their capacity as supervisors, inspectors, and cost accountants—carry out gravity conservation and treating programs with the help of the lease personnel, and have demonstrated to the lease men savings that can be made through preventing gravity and volume losses.

One method for demonstrating and measuring losses is to secure a composite well-head sample, and treat it cold in a closed container and compare its gravity with that shown on run tickets. Applying the gravity loss to a volume-vs.-gravity curve actually determined for that crude, or applying the 2.6 per cent volume per degree, which is reasonably close for all crudes, shows the volume loss sustained. Another method is to make changes and compare gravities as shown on run tickets immediately preceding and following the changes, or comparing run tickets on adjacent leases where the oil is produced by the same method.

The methods used for treating probably have greater effect on gravity loss than any other one phase of oil production. Many obsolete and unscientific methods for treating oil are still carried on. In many instances, "rolling" tanks with gas or air to secure treatment results in about 1½ to 2 dgr. API loss of gravity in the Seminole area. To prevent this loss, small portable pumps driven by air-cooled gas engines are used to circulate oil turned down by the pipe line back through the treating system. As an example, circulating acid-cut oil in the Jesse area showed a loss of only 0.4 deg. API. In this particular instance, no treating system had been installed, and a portable heater was moved to the location to accomplish the treating; and, although there was some expense involved in moving and connecting the pump and heater, the estimated savings over "rolling" amounted to $27 on 600 bbl. treated. Steaming, although still practiced in some instances, has finally been recognized as the poorest method for treating oil, and has been abandoned in practically all cases.

The use of treating systems that are gas-tight results in the largest retention of gravity in the crude, all other conditions being equal; and this is particularly true on systems where pressure can be maintained and heat exchangers

(*Continued on page* 34)



E. J. (Jack) Lyon

Born Kaufman County, Texas, December 5, 1897, married and has two children. Elementary and High School education received in Texas. Took first course in Oil Field Engineering offered by Missouri School of Mines at Rolla. Two years military service during World War. Worked in Oklahoma, during summer vacations from College, for Gilliland Oil Co. and Empire Oil and Gas Company. Came to California in 1925 and entered employ of Standard Oil Company of California, this service has been continuous to present, the last ten years in the capacity of Natural Gasoline Plant Supervisor. First became member of C.N.G.A. 1929, secretary Taft Chapter 1937 and Chairman from June 1938 to present. Member San Joaquin Chapter A.P.I., Masonic Lodge, Taft Petroleum Club and Charter member of American Legion. (Harold Langwith Post).

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CNGA

October, 1938

This section, a regular monthly feature of the California Oil World, is devoted to the activities of the California Natural Gasoline Association. The California Oil World is the exclusive official publication of the California Natural Gasoline Association, so designated by vote of the Association Executive Committee in a meeting on August 19th, 1937.

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C.N.G.A. Annual Fall All-Day Meeting Slate

Assures Record Attendance Nov. 4

Headlined by a series of technical papers which will present the various phases of the increasingly important subject of "Pressure Maintenance," the program for the 13th Annual Fall All-Day Meeting of the California Natural Gasoline Association, scheduled for Friday, Nov. 4, at the Ambassador Hotel, Los Angeles, is announced by H. R. Linhoff, president.

That this all-day meeting is destined to establish a new high in attendance is assured not only by the timeliness of the featured subject, but by the equally important supporting subjects which combine to round out the most finely balanced program ever presented in the association's history.

Of particular note is the fact that men of the highest calibre, each of whom is a recognized authority in his field and each of whom draws on a wealth of knowledge for the subject matter of each individual paper, have been secured. Thus, it is pointed out, the program, itself, is wholly in harmony with the keynote subject. As pressure maintenance is the return of natural gas to the producing zone for the maintenance of a close approach to the original rock pressure, thus increasing ultimate petroleum recovery to limits heretofore impossible and, at the same time, recharging the gas with added fresh natural gasoline fractions in each recycling, the entire program for the event will, in fact, be a veritable review of technical data, amassed by the speakers through years of training, research and experience.

In releasing the program, President Linhoff stressed the fact that an extremely close relationship exists between the problems of natural gasoline production and the production of petroleum, natural gas and liquefied petroleum gases. So pronounced has this become that the line dividing the various fields has been erased almost entirely by overlapping and the problems of one group are now, in no small measure, the problems of all.

In recognition of this fact, the program has been planned to benefit not only natural gasoline men but to benefit, as well, engineers and chemists in all branches of the petroleum, natural and liquefied petroleum gas industries. On behalf of the association's officers and members, President Linhoff extended a cordial invitation to all to attend and issued a request to all association members asking them to communicate with their associates in the related fields and issue a personal invitation. No registration fees are charged for attendance at any of the day-time meetings. The only event on the program for which any charge is being made is the banquet held in the evening. Tickets for this affair are $3.50 per plate. Because of the anticipated heavy demand for banquet tickets those planning to attend are urged to communicate immediately with George L. Tyler, secretary, 510 West 6th Street, Los Angeles, 'phone VAndike 5521.

PROGRAM

California Natural Gasoline Association
13th Annual Fall All-Day Meeting.
Friday, November 4, 1938.
Ambassador Hotel, Los Angeles, California.
Morning Session: 9:30 A.M.
Meeting Called to Order.
Opening Remarks: H. R. Linhoff, President.
Report: Technical Committee's Report of Problems Affecting the Natural Gasoline Industry.

Papers:

"A New Molecular Weight Test for Absorption Oils." By: Mr. D. B. Johns, Research Engineer, Research Department, Natural Gasoline Division, Standard Oil Company of California.

"A Hydrometer Test Applied to Liquefied Petroleum Gases." By Mr. W. M. Schaufelberger, Research Engineer, Research Department, Natural Gasoline Division, Standard Oil Company of California.

"Advances in Design and Operation of Compressor Plants." By Mr. T. Hume West, Assistant Chief Engineer, Industrial Fuel Supply Company.

Afternoon Session:

Papers:

"Natural Gas in Storage, Repressuring and Pressure Maintenance." By Dr. Stanley G. Herold, Consulting Geologist and Engineer.

"Possibilities and Limitations of the Production of Oil Under Pressure Maintenance from California Fields." By Mr. A. C. Rubel, Director of Production, Union Oil Company of California.

"Effect of Pressure Maintenance on Gasoline Plant Design." By Mr. Henry N. Wade, Parkhill-Wade, Consulting and Construction Engineers.

"Possible Utilization of Lighter Hydrocarbons such as Ethane, Propane and Butane for the Production of Chemicals." By Dr. Robert E. Vivian, Associate Professor of Chemical Engineering, University of Southern California.

Evening Session: 7:00 P. M.
Banquet and Entertainment.

Following the opening remarks of the president and the presentation of a report on problems affecting the natural gasoline industry by the association's technical committee, the morning session which will start promptly at 9:30 A.M. will feature three papers. The first of these will be "A New Molecular Weight Test for Absorption Oils" by D. B. Johns. The method is based on the ability of the oil to absorb butane gas. The apparatus will be demonstrated on the stage. This will be followed by a paper entitled "A Hydrometer Test Applied to Liquefied Petroleum Gases" by W. M. Schaufelberger. He will present a simplified method for determining the specific gravity of liquefied gases by means of a hydrometer at low temperatures. The method is accurate and quick and is particularly adapted for use in connection with tank car shipments. A demonstration of the apparatus will be given from the stage. Mr. Johns and Mr. Schaufelberger are Research Engineers associated with the Research Department, Natural Gasoline Division, Standard Oil Co. of California. The morning session will close with a paper entitled "'Advances in Design and Operation of Compressor Plants" by T. Hume West, Assistant Chief Engineer, Industrial Fuel Supply Co.

After adjournment for luncheon, the afternoon session will open with a paper by Stanley C. Herold, Consulting Geologist and Engineer. The subject of Dr. Herold's paper will be "Natural Gas in Storage, Repressuring and Pressure Maintenance." A graduate of Stanford where he majored in geology and mining engineering, Dr. Herold holds an A.B. and Ph.D. degree from that university. In January 1913 Dr. Herold entered explorative work in South Amer-

ica for Peruvian Petroleum Corp. in Venezuela, Standard Oil Co. of N. Y. in Colombia, the Benedum-Trees interests, Pittsburgh in Colombia, Ecuador, Argentina and Bolivia as well as in Oklahoma and Texas. Domestically he has served such interests as Henry L. Doherty in New York, Pennsylvania and Ohio, Gypsy Oil and Gas Co. in Kansas and Texas, Sinclair Oil and Gas Co. in Oklahoma and Kansas. For the last 15 years Dr. Herold has engaged in private consulting work.

"Possibilities and Limitations of the Production of Oil Under Pressure Maintenance from California Fields" is the subject of a paper to be delivered by A. C. Rubel, Director of Production, Union Oil Co. of California. A graduate of the University of Arizona where he majored in mining engineering, Mr. Rubel spent several years in Mexico making geological surveys, later to become resident geologist for the Union Oil Co. of California. In 1925 he became Petroleum Engineer for that company and his long association with that firm lead to his present capacity as Director of Production. He is, as well, a member of that firm's Board of Directors and its Executive Committee.

The third paper of the afternoon is entitled "Effect of Pressure Maintenance on the Design of Gasoline Plants" which will be presented by Henry N. Wade, Parkhill-Wade, Consulting and Construction Engineers. In presenting this paper Mr. Wade brings to the platform the valuable knowledge gained from his experience with this subject. He was actively connected with two of the most prominent pressure maintenance units installed in the Mid-Continent during the last twelve months.

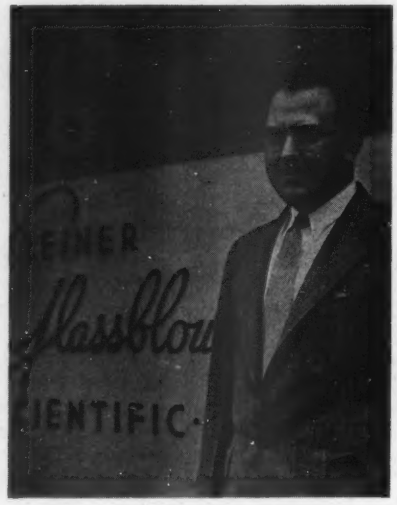
The afternoon session will close with a paper entitled "Possible Utilization of Lighter Hydrocarbons such as Ethane, Propane and Butane for the Production of Chemicals" by Robert E. Vivian, Associate Professor of Chemical Engineering, University of Southern California. Dr. Vivian has been associated with International Agricultural Co. as Chemical Engineer and he served with the General Chemical Co. in a similar capacity. During this latter connection, Dr. Vivian conducted a survey on the subject of petroleum hydrocarbons utilization and later he was Director of Research, Metals Disintegrating Co. of Elizabeth, N. J.

The banquet is scheduled for 6:30 P. M. and the entire evening session will be given over to entertainment.

Members of the Fall Meeting Committee are: W. C. Dayhuff, Chairman; C. D. Gard, W. W. Robinson, Jr., Lyman Scheel, P. S. Magruder, B. D. Balthis, George Christen and George L. Tyler.

Members of the Entertainment Committee are: George Christen, Chairman, Gordon Green, R. Keith Lamont, A. E. Wetzel and George L. Tyler.

Glass Blowing Expert



C. W. Greiner

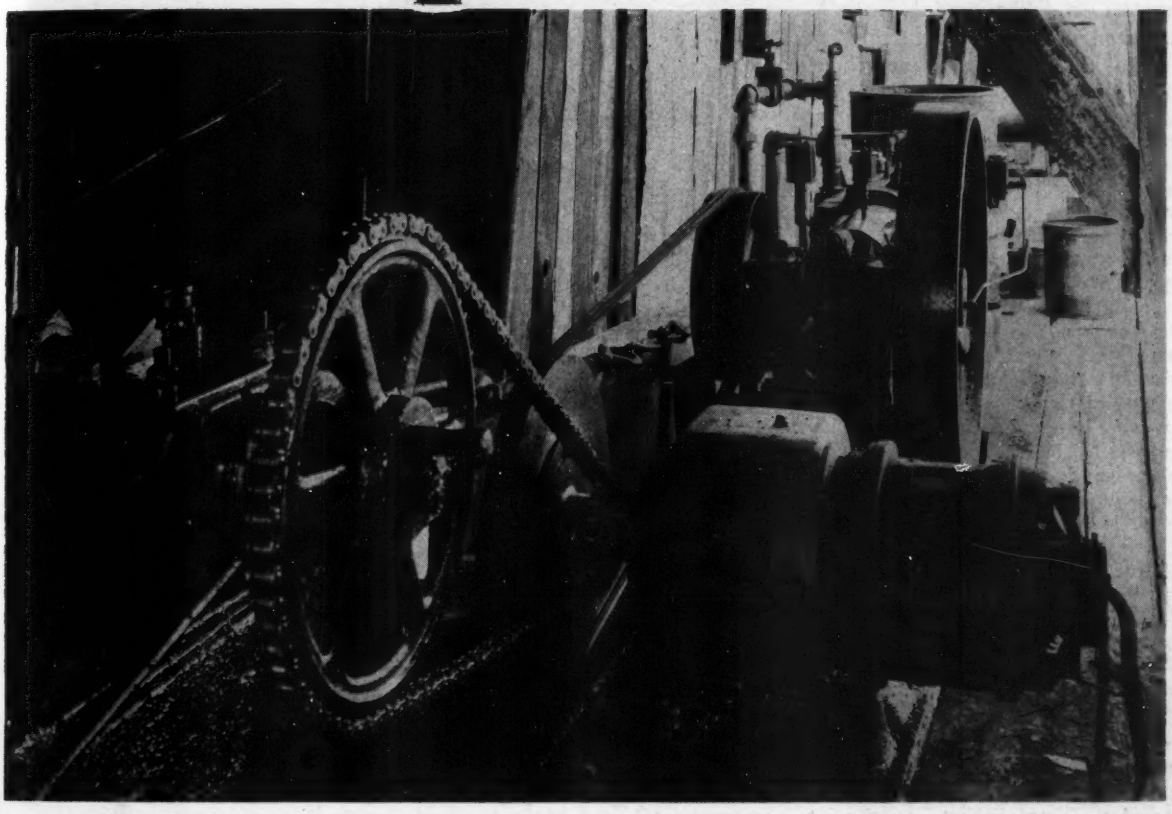
Among the arts there is probably none which provides more experts who have followed family tradition of many generations as that of glass blowing. Refiners and natural gasoline operators are finding that they have one of these expert artisans in Los Angeles ready to serve them when they need low temperature fractionating equipment, butane weathering tubes, and special physical and chemical apparata. This is C. W. Greiner, 251 West Santa Barbara Avenue, who served his apprenticeship in the glass centers of Germany, and whose first American connection was with the 50-year old Emil Greiner Co., in New York City. Mr. Greiner has been in Los Angeles since 1925, when he installed one of the first neon plants on the Coast.

Mr. Greiner, who has manufactured scientific equipment for many years, has recently expanded his plant and installed much new equipment to expedite the production of apparatus for the petroleum industry.

Motor truck trains with ten trailers are burning up the mileage on Italy's new express roads. A concrete ridge in the middle of the road is straddled by the trucks, which have rollers that fit against the sides of the ridge. The automatic guidance allows the driver to leave his seat while the train is in motion to inspect the trailers.

Rapidly nearing completion is the $5,000,000 Richfield refinery at Watson. These striking night views were taken by Howard Cagle.

AN OLD-TIMER PLAYS A MERRY TUNE



Axis Petroleum Co., Capitol No. 1, Signal Hill, 15 H.P. motor. This old timer has been in constant service since June, 1932, with no repair cost.

Electric motors may get old in terms of service, but they always have young ideas. It is not unusual for an electric motor to be in constant service for eight to ten years with only minor repairs or no repairs at all.

Old or new, electric motors for pumping play the same merry tune of dependable service at low costs. Let an Edison power engineer give you the facts and figures about electrical pumping. There's no obligation. Just telephone your Edison office and ask an Edison engineer to call at your convenience.

ELECTRICITY *at work in the oil fields*

10-38

SOUTHERN CALIFORNIA EDISON COMPANY LTD.

Low Temperature Recovery of Casinghead

Gasoline and Thermal Polymerization

By D. W. Wilson
M. W. Kellogg Company,
225 Broadway, New York, N. Y.

A recent technical publication,—with the title "Natural Gas Dehydration and Refrigeration Recovery of Casinghead Gasoline",—discussed at length a new method of production of natural gasoline. The contents of this earlier article are covered only in part in the present paper; therefore, it is believed that those interested in this subject will find it useful to read this earlier article.

This new recovery plant does not use any absorption but employs rather a combination of refrigeration and substantially complete dehydration of the gases. Fundamentally, this process depends upon cooling—(after dehydration)—the incoming feed gas, to a sufficiently low temperature so that all the desirable constituents are liquefied. Subsequently the natural gasoline is recovered, by the usual stabilization, from this low temperature liquid. Successful application of this involves a knowledge of the physical properties of hydrocarbons at varying low temperatures and varying pressures. The necessary background, both from the theoretical and the practical point of view, has been acquired by the M. W. Kellogg Company from extensive laboratory research, as well as the actual operation of several thermal polymerization plants. In these plants dehydration of the gas and low temperature condensation are employed exactly as in the case for natural gasoline recovery.

One casinghead plant of this type has been in successful operation for about six months. It is located at the plant of the Duval Gasoline Company, in Benavides, Texas,—about seventy-five miles from Corpus Christi. This installation was designed to handle 6,000,000 cubic feet per day of wet gas containing about 2.5 gallons per thousand of 26 lb. Reid vapor pressure natural gasoline, and therefore to produce about 15,000 gallons per day of finished product. Actually, as will be discussed later, the incoming gas proved to be richer than this.

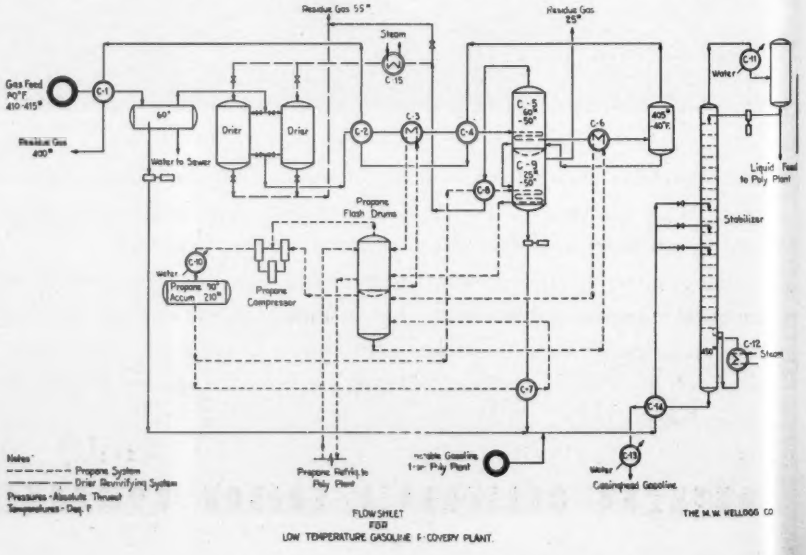
Description of Duval Plant

Reference to the flow sheet will indicate readily the operation of the plant. Incoming wet gas at substantially atmospheric pressure passes through a scrubber to remove any entrained liquid. This gas is then compressed by gas engine driven compressors to a pressure of 50 to 60 pounds gauge. This is then water-cooled by an exchanger, then passed through an exchanger where it is further cooled by the cold residue gas to a temperature of 40°F. At this temperature some of the heavy hydrocarbons, as well as considerable liquid water, have condensed. The mixture of liquid and gases is separated in a suitable drum. The water is drawn off and goes to the sewer, while the liquid hydrocarbons are pumped to the stabilizer as later described. The gas from the separating drum is passed through either one of two parallel driers. Here it is freed of water to such an extent that no condensation of liquid water or any solid formation occurs at temperatures as low as —50°F. The water-free gas is then further cooled to a temperature of —35°F. by an exchanger, in which propane evaporates at practically atmospheric pressure. The resulting mixture of liquid hydrocarbons and gases is separated in a drum. From this the cold vapors serve as a heat exchange medium for the feed gas as outlined above. The cold liquids are pumped through a heat exchanger, cooling the liquid propane. Then they are joined by the liquid hydrocarbons produced in the heat exchanger located just before the driers. This liquid is then heat exchanged against the finished gasoline from the bottom of the stabilizer. The preheated liquid then passes into a twenty tray stabilizer, reboiled at its base by a conventional steam heated reboiler. The stabilizer usually has operated at a pressure of 175 lb. gauge. The overhead vapors from it are partially condensed in a water cooled condenser, and the resulting reflux is collected in a drum, from which it is pumped to the top of the stabilizer.

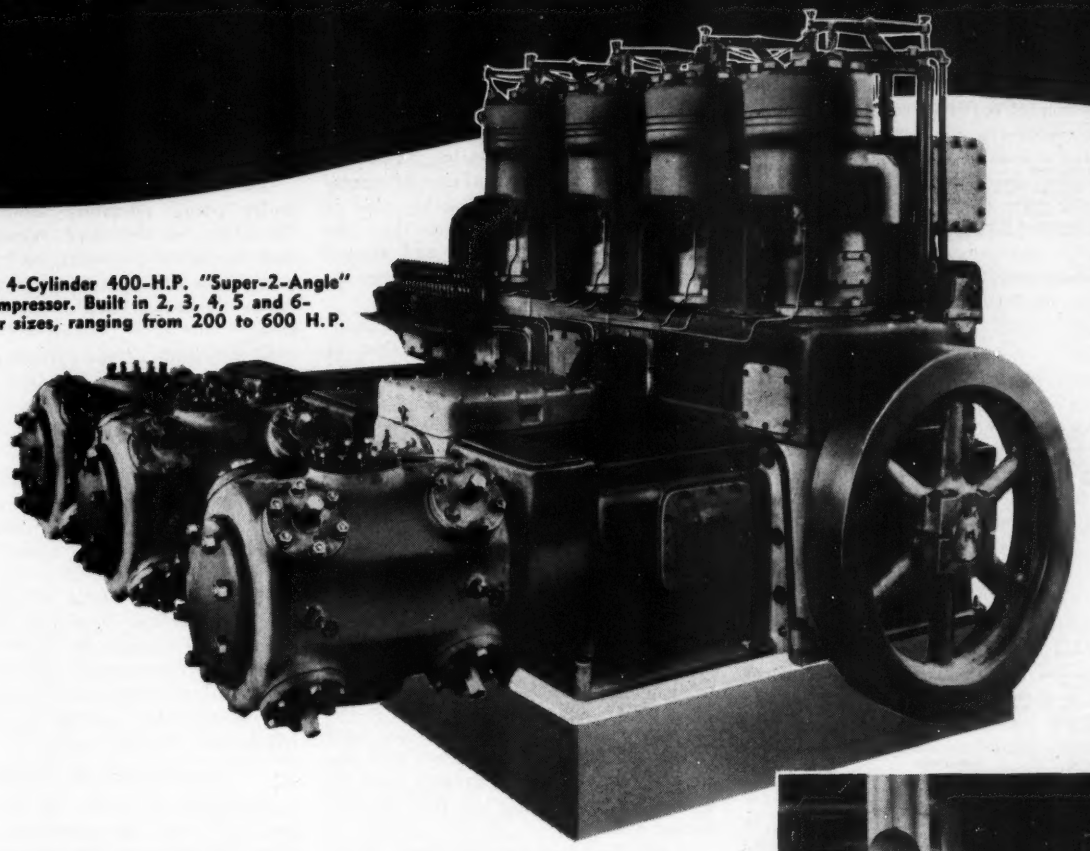
The bottoms from the stabilizer are heat exchanged with stabilizer feed, as mentioned above, further cooled with water, and then pass to storage as finished natural gasoline of the desired Reid vapor pressure.

The driers, as stated above, are in parallel, and are filled with granular material having high absorptive capacity for water vapor. One drier operates for twenty-four hours, removing water from the gas passing through it. This unit is then cut out of service and the other is put in use. The accumulated water in the absorbent must now be removed. This is done, in this plant, by passing through the drier a small portion of the residue gas which has been heated, by a steam heater, to a temperature of 325 to 350°F. This stream of hot gas vaporizes the water in the drier. After a sufficient time the water is completely removed, the steam-heating is then cut off, and the drier cooled by continuing to pass residue gas through it. At the end of six to eight hours the heating, water removal, and cooling are complete, and the drier is ready to be put back into service and the cycle repeated.

The refrigeration cycle comprises the following: propane evaporates at practically atmospheric pressure in the heat exchanges as described above in discussing the main plant flow. A drum is provided to prevent any entrained liquid from entering the compressor. Propane vapor from this drum passes to the compressor, from which it is discharged at a pressure of about 200 lbs.



NEW TYPE NATURAL GASOLINE PLANT *uses* CLARK "ANGLE" COMPRESSORS



CLARK 4-Cylinder 400-H.P. "Super-2-Angle" Compressor. Built in 2, 3, 4, 5 and 6-cylinder sizes, ranging from 200 to 600 H.P.

HERETOFORE, low-temperature cooling with propane gas has been confined to refinery use. Recently, however, propane refrigeration has been applied successfully in a new-type natural gasoline plant, at Benavides, Texas. The process involves freeing the gas of water, then cooling the gas by propane refrigeration to the required temperature for liquifying the natural gasoline.

In this new-type plant, CLARK "Super-2-Angle" Compressors are being used for compressing the natural gas, in a single stage, and the propane gas, which is subjected to two-stage compression.

The CLARK "Angle" Compressor installation consists of two 400-H.P. units —equipped for handling both natural gas and propane simultaneously; and one 300-H.P. unit — for propane exclusively.

Write for new catalog describing CLARK "Angles" in natural gasoline, refrigeration, pressure maintenance and repressuring service.

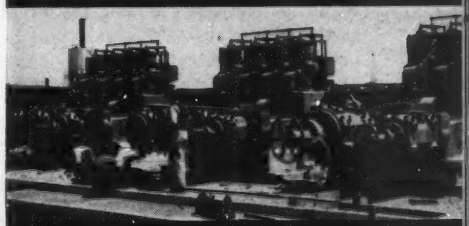
CLARK BROS. COMPANY . . . . OLEAN, NEW YORK

Smith-Booth-Usher Co.

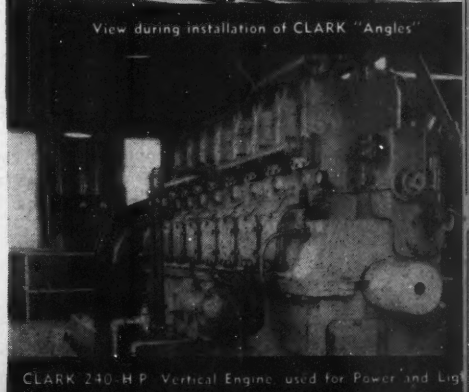
LOS ANGELES, CALIF., PACIFIC COAST DISTRIBUTORS

CLARK

Interior, showing battery of CLARK "Angles"



View during installation of CLARK "Angles"



CLARK 240-H.P. Vertical Engine, used for Power and Lig

per square inch. It is then cooled and condensed by water and passes to a small storage drum. From this drum the liquid propane is cooled by heat exchange with the cold hydrocarbons mentioned above. The propane liquid is then cooled by expansion to atmospheric pressure, and it is then ready for use in the propane evaporator. It will thus be seen that the refrigerating cycle is a closed one, and that there is no direct contact between the propane and the gases being cooled.

Plant Data

Feed Gas Compressor	600 H.P.
Propane Compressor - Installed	450 H.P.
Propane Compressor - Used	300 H.P.
Boiler H.P. - Installed	170 H.P.
Boiler H. P. - Used	75 H.P. (About)
Water Circulation - Installed (Except Compressor)	1700 G.P.M.
Water Circulation - Installed (Compressor)	700 G.P.M.

Typical Gas Feed Analysis		Tail Gas	Stabilizer Gas
CH_4	65.46	86.12	28.96
C_2H_6	5.89	7.48	12.57
C_3H_8	4.82	4.36	37.37
C_4H_{10} (Iso)	1.27	.04	14.73
C_4H_{10}	1.57	1.08	8.88
C_5H_{12} (Iso)	1.13	0.00	0.00
C_5H_{12}	.49	0.00	0.00
C_6+	1.87	0.00	0.00

Stabilized Gasoline

C_5H_{12}	0.00	Gravity	77	
C_4H_{10} (Iso)	2.67		90°F.	Initial
C_4H_{10}	19.17		96	5%
C_5H_{12} (Iso)	19.80		100	10
C_5H_{12}	13.27		110	20
C_6+	46.09		120	30
			112	40
			144	50
			160	60
			180	70
			196	80
			220	90
			305	95
			325	E.P.
			95.8	Rec.

18.4# Reid Vapor Pressure

Pressures

Feed Gas	
Plant Inlet	Atmos.
Comp. Discharge	50 - 60 lbs. gauge
Residue Gas	40 - 50 lbs. gauge
Propane	
Comp. Suction	Atmos. to 2 lbs. vacuum
Comp. Discharge	Approx. 190 lbs.
Stabilizer	175 lbs.
Steam	200 lbs.

Temperatures

Feed Gas:	
Entering Driers	40°F.
Final Cooler Outlet	-35°F.
Gas for Drier Revivification	325-350°F.
Residue Gas from Plant	75°F.
Stabilizers	
Feed Entering	150°F.
Bottoms	230°F.
Top	140°F.
Reflux Drum	100°F.

Quantities

Feed Gas ..... 6,000,000 - 6,500,000 Cubic Feet Per Day

Gasoline Produced ... 13,000 - 15,000 Gallons Per Day

The above analyses are representative, although not average, and not entirely consistent, especially with respect to the feed gas composition. This varied with the temperature and the pressure at the separators,— this variation being particularly noticeable from day to night on account of the widely differing day and night temperatures.

The plant was designed to produce 26-lb. Reid vapor pressure gasoline but current market conditions at the time of taking the above data rendered it advisable to produce the 18.4-lb. gasoline.

It is of interest to note that the analyses indicate 100% recovery of isopentane and heavier, with complete absence of propane in the stabilized gasoline.

The plant has continuously processed 6,500,000 cubic feet per day of gas and produced therefrom 15,000 gallons per day of 18.4-lb. Reid vapor pressure gasoline, as compared to designed figures of 6,000,000 cubic feet daily and 15,000 gallons per day of 26-lb. Reid vapor pressure gasoline. Capacity was limited to this figure by the feed gas compressors. It will be noted that the installed propane compressor capacity was 50% in excess of that actually used.

Discussion of Plant and Process

Brief study of the included flow sheet and description of process will show that the plant consists of heat exchangers, driers, refrigeration system, stabilizer, and necessary accessories. This has resulted in extreme simplicity of operation and of control. Possibly this is best illustrated by the fact that the plant has been shut down and started up several times in fifteen minutes to one hour.

It is interesting to examine the flexibility and possibility of expansion of this plant. Considerably more than 6,000,000 cubic feet daily of gas are now available, and, therefore, greater capacity is of real importance. After investigation it has been calculated that solely by addition of feed gas and propane compressors, at least one-third additional gas may be processed with same recovery. Considerably greater further increase in capacity may be obtained by simple and inexpensive parralleling of some exchangers. The inherent simplicity of the equipment lends itself readily and cheaply to provisions for greater gas throughput, since the stabilizer was purposely designed very conservatively and the drier with no change easily carry a greater load by decreasing the length of time of the drying cycle.

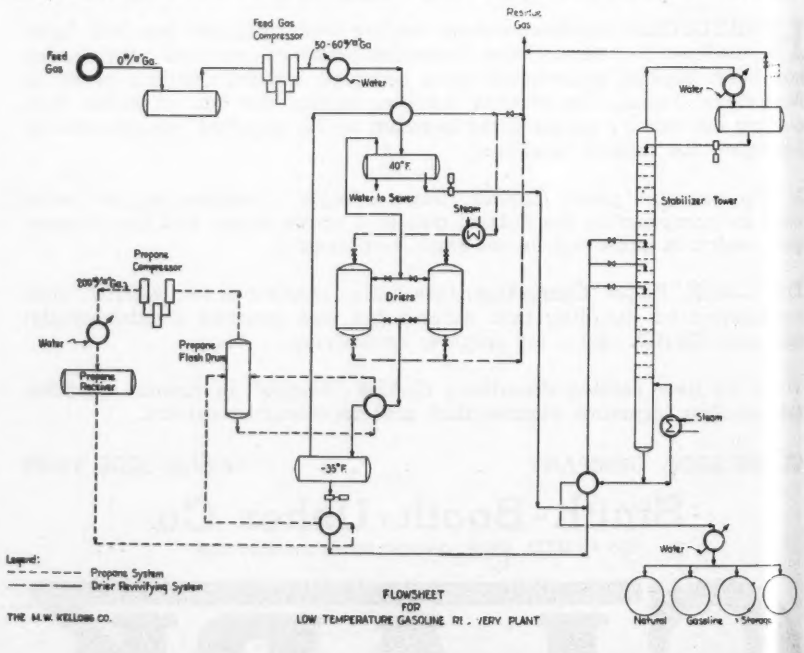
It will be noted that no direct steam is used and that steam consumption is confined to (a) small pumps, (b) heating gas for drier revivification, and (c) stabilizer reboiling. Pumps may readily be driven by gas if desired, and the heat for drier revivification may well be supplied by a remotely located gas-fired heater or by hot flue gas directly. Thus, steam needs may be economically limited to that for reboiling the stabilizer. Where especially important—by modification of the processing—even the stabilizer reboiler heat may be supplied otherwise, thus completely eliminating steam.

Due to the extreme simplicity of the entire plant, operating labor is low. There are, on the plant described here, two operators per shift, and it is apparent that a much larger plant or other duties could be handled by these two men.

In operation of the refrigeration system care must be taken that the propane used is free from traces of water and the piping and valves do not leak as otherwise ice difficulties or propane losses will occur. Observance of ordinary precautions, together with experience gained by operation, indicates that ice troubles with the propane need not happen, and the cost of propane make-up is very small. It is not possible to give any average figures on this as it depends so completely upon the particular plant operation. Essentially, the refrigeration system does not differ from that used in the common household refrigerators so widely used.

Applicability of Process

Operating at 50-60 pounds pressure and with feed gas containing two to three gallons per thousand represents



THE M. W. KELLOGG CO.

FLOWSHEET FOR LOW TEMPERATURE GASOLINE RECOVERY PLANT

only one condition of the many encountered in natural gasoline recovery. An endeavor has been made to study the future field of usefulness of this process. To this end preliminary designs have been made for the following cases:

(a) 200 pounds pressure and 2.5 gallons per M.

(b) 350 pounds pressure and 1 gallon per M.

(c) 400 pounds pressure and 1 gallon per M.

(d) 450 pounds pressure and 1 gallon per M.

(e) 350 pounds pressure and ¼ gallon per M.

It is not proposed to discuss all of these designs but rather to study one case involving incoming feed gas at 400-lb. pressure and containing one gallon per M of 22-lb. Reid vapor pressure casinghead gasoline. This will be presented in the form of a plant including the following:

(1) Dehydration of feed gas.

(2) Casinghead gasoline recovery.

(3) Production of liquid feed for thermal polymerization unit.

(4) Thermal polymerization unit.

A discussion of this plant will indicate the application of low temperature methods to high pressure casinghead gasoline recovery as well as to show in some detail the possibilities involved in the combination of refrigeration natural gasoline production and thermal polymerization. The advantages gained by combining these two processes are considerable, and it is believed that these can be best illustrated by consideration of plant designs prepared for such a combined unit. While these designs have been carefully prepared, they do not represent actual plant installations.

High Pressure Casinghead Recovery

Let us consider first the processing required for low temperature recovery at high pressure of natural gasoline. In reviewing this design it must be remembered that it has been predicated on recovery, by water cooling only, of liquid feed for thermal polymerization.

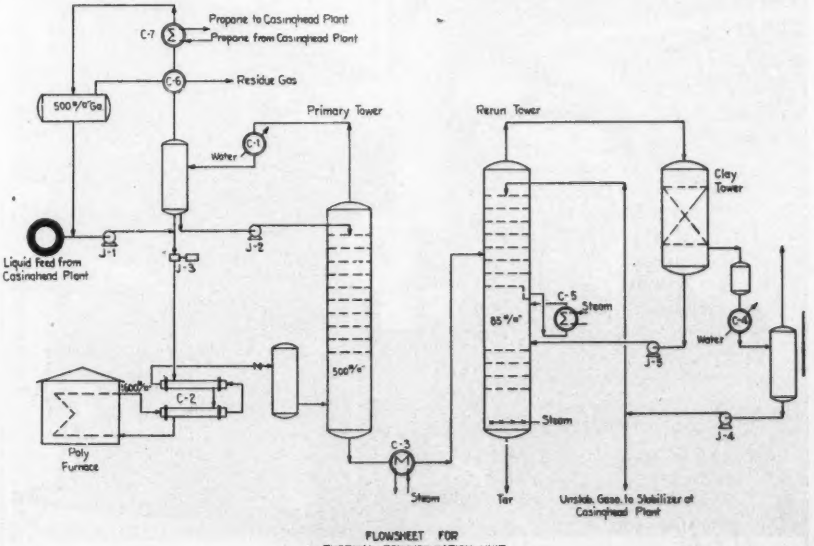
Reference to the flow sheet shows incoming gas feed at 80°F. and about 400-lb. gauge pressure. This is cooled by heat exchange with high pressure residue gas to 60°F. The endeavor in this cooling is to reach as low a temperature as possible with the avoidance of hydrate formation,—since, in this way, the water removal duty of the driers is kept at a minimum. At this condition water will be condensed as well as some of the heavier hydrocarbons. From a suitably baffled separating drum water is discharged to the sewer while the heavier hydrocarbons condensed are pumped into the stream of material to be stabilized. Uncondensed vapors from this 60° drum are passed through either one of two parallel driers. The drier installation and its operation in this instance are entirely similar to that described in the case of the Duval plant. The dried gases are further cooled by heat exchange against high pressure residue gas, then are still further cooled by heat exchange against relatively high temperature propane refrigerant.

Next, these gases are further heat exchanged against the cold high pressure residue gas. The gases are still further cooled by passage through a flash chamber, indicated on the flow sheet as C-5. The purpose of this will be explained more in detail shortly. Finally, the gases are cooled by propane to a temperature of about —40°F. At this temperature the mixture of liquid and vapor is separated in a suitable drum. The cold residue gas from this drum is used as described above for the cooling of the incoming feed gas. The separated liquids flow into unit C-5, where the pressure is allowed to drop to about 60-lb. absolute, and in which the temperature is held at about —50°F. The resulting liquid from this flash passes through another drum, in which the temperature is held at about —50° and the pressure reduced to about 25-lb. absolute. The purpose of these two flashes is the elimination of methane and ethane in sufficient quantities so that the stabilizer overhead vapors may be totally condensed by the use of water only. In this operation, losses of propane and butane are small, and there is substantially no loss of pentane and heavier. In the design the overall recovery of C_{5+} has been set at 99%. The liquid resulting from the 25-lb. absolute flash is pumped through a heat exchanger against the propane refrigerant.

This liquid is then joined by the hydrocarbon liquid produced in the 60°F drum, and also by the unstable gasoline from the polymerization unit. These three streams constitute the stabilizer charge. This charge is heat exchanged against the stabilizer bottoms in the usual fashion. After this step it is fed to the stabilizer, operating at about 450-lb. The stabilizer is reboiled in the normal fashion by indirect high pressure steam. After heat exchange and water cooling, gasoline of the desired Reid vapor pressure, including the natural casinghead and that produced from polymerization, passes to storage. As previously mentioned, the low pressure flashes have so reduced the amount of methane and ethane in the stabilizer charge that the stabilizer overhead may be totally condensed by means of water only. The required reflux is pumped to the stabilizer from the reflux drum, and the excess condensate forms the charge for the polymerization unit.

Operation of the driers has been so fully described with reference to the Duval plant that it is believed necessary in this case simply to call attention to the fact that the revivification of the driers is accomplished by heated residue gas at 55-60-lb absolute pressure. In other words, the residue gas leaving the plant at 400-lb. pressure is substantially completely free of water vapor.

In the flow sheet the propane system is indicated by dotted lines, and it is believed that this is self-explanatory. However, it may be well to mention that on account of the resulting power economy, the required propane cooling has been set up in two steps. It is planned to do as much cooling as possible with propane at the higher temperature. Complete detailed study of the problem might suggest some modification and improvement in the heat exchange system with respect



FLOWSHEET FOR THERMAL POLYMERIZATION UNIT LIQUID FEED FROM CASINGHEAD PLANT.

THE M.W. KELLOGG CO.

to propane, although the one suggested here is thoroughly feasible and has much to recommend it.

It is proposed that the residue gas available at 25-lb. absolute pressure should be used as boiler fuel. This gas will constitute between 0.5% and 1.0% by volume of the incoming feed gas. The residue gas at 55-lb absolute pressure amounts to approximately 5% by volume of the feed gas. This gas may be used in part as boiler fuel, in part as fuel for the polymerization unit, and the balance may ordinarily be consumed for field use. It should be mentioned that if these quantities of low pressure residue gas are, for any given case, objectionable, it is possible to decrease, or, if required, to eliminate them completely by suitable modifications in the design.

Thermal Polymerization Unit

Having considered the natural gasoline recovery unit, attention is now directed to the thermal polymerization unit and its flow sheet. The fresh feed in this unit is the liquid produced from the stabilizer overhead. This material is pumped into the suction of the main furnace charge pump. This latter pump, designated on the flow sheet as J-3, has a discharge pressure of 1800 lbs. to 2000 lbs., and feeds material through a heat exchanger, through the furnace, thence again through the heat exchanger, and finally into a fractionating tower operating at 500-lb. pressure and at about 200° to 250°F. The furnace outlet conditions are 1025°F. to 1050°F. and a pressure of about 1600 lbs. From the bottom of the 500-lb. tower is produced the polymerization gasoline, together with the small amount of tar made and appreciable amounts of propane and ethane. This mixture is, after being heated by steam, fed to the rerun tower, operating at about 85 lbs. and 300° to 350°F. From the bottom of this tower is produced tar in the amount of 2 to 4% by volume of the gasoline. The overhead vapors from the rerun operation pass through a suitable bed of clay, then are condensed by water. A portion of this condensate is pumped as reflux to the top of the rerun tower. The balance contains the polymerization gasoline as well as appreciable amounts of propane and lighter constituents. It is proposed, as previously described, that this unstable product should be pumped to the casinghead plant and there stabilized together with the natural gasoline. It is obvious that, if desired, this product may be kept entirely separate from the casinghead gasoline.

The overhead vapors from the primary tower are passed through a condenser, from which is produced liquid recycle as well as reflux for the 500-lb. tower. The liquid recycle so produced passes from a suitable drum to the suction of the main furnace charge pump, J-3. The uncondensed vapors from this drum are further cooled by the use of propane refrigerant from the casinghead plant. The mixture of vapors and condensate from this cooling passes to a drum, and the separated liquid then mixes with the liquid feed from the casinghead plant and thence to the suction of the main furnace charge pump, J-3. The uncondensed vapors from this drum are heat exchanged as indicated on the flow sheet and then are available as residue gas at 500-lb. pressure.

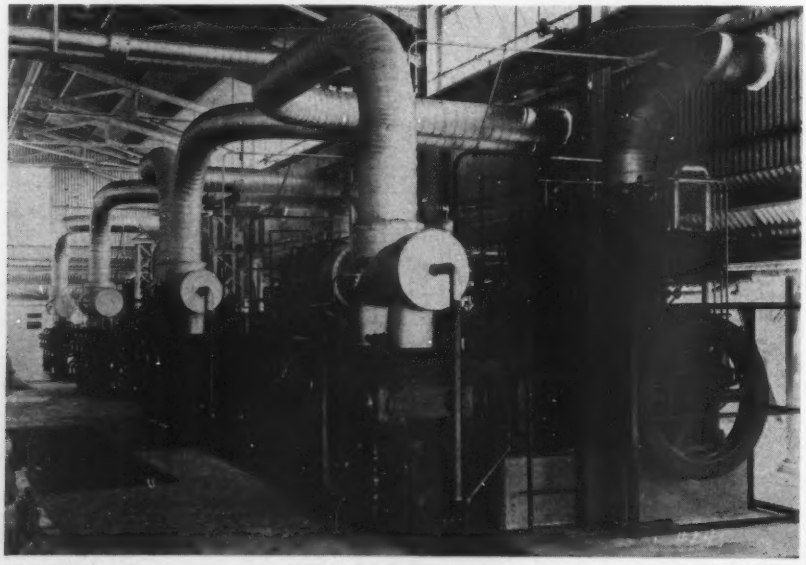
The volume of this gas, in this design, amounts to about 5-6% of the incoming feed gas to the casinghead unit, and it has a heating value 10% higher than that of the fresh feed gas. The mixture of the 400-lb residue gas from the casinghead plant and that at 500-lb. from the polymerization unit represents 90-92% of the volume of the incoming feed gas and this mixture has a calculated gross heating value of 1100 BTU's per cubic foot as compared to a similar figure of 1280 BTU's per cubic foot for the feed gas.

It is estimated that the yield of polymerization gasoline,— as 22-lb Reid vapor product,—produced by this processing will be from 0.50 to 0.55 gallons per M of entering feed gas. Thus, it will be seen that the overall yield of 22-lb. Reid vapor pressure gasoline is increased over 50% as a result of the operation of the polymerization unit.

Discussion of Design

As previously mentioned, in the casinghead gasoline recovery plant the design has been so arranged as to permit maximum economic recovery of liquid feed for the polymerization unit. In the case of high pressure gasoline production, where no polymerization unit is contemplated, considerable modification in flow would be employed. Under this condition it is probable that the stabilization would be done at a lower pressure, thereby eliminating the need for any pumps for the stabilizer charge. It is very probable that all possible excess stabilizer reflux liquid would be produced. Such excess liquid would then be allowed to vaporize into the residue line previous to any heat exchange. In this way considerable refrigeration would be recovered by the evaporation of this liquid. Considerable investigation of this operation has shown essentially the same processing would be employed as shown on the included flow sheet but that the modifications and simplifications generally suggested above will result in appreciably lower first cost as well as lessened operating costs, due, principally, to lower refrigeration requirements.

The casinghead plant design suggested here contemplates a recovery of 55% of the propane and between 85% and 90% of the C_4 compounds. It is obvious that, if desired, a greater recovery of these compounds may be obtained by the use of lower final temperatures in the cooling of the feed gas. If this be done, added equipment and operating charges are incurred, both in the casinghead and polymerization units. Obviously, such procedure will result in the production of greater yields of polymerization gasoline. The desirable recovery for any given situation will depend upon the economics under prevailing local conditions.



Interior of Duval Plant featuring the Clark Bros. super 2-cycle right angle compressors.

With respect to the thermal polymerization unit, it is evident that the production from this unit, and consequently the equipment requirements throughout, may be modified by the degree of recovery of propane and butane which is desired. In the plant described in this paper it is proposed to cool the residue gas in unit C-7 to a temperature of about 20°F. The net result of this operation is a recovery, in the polymerization unit, of about 85% of propane and 98% recovery of C_4 compounds. It is obvious that, if desired, water cooling only could be used on the overhead products from the primary tower. In this case the recovery of propane and butane is decreased, and the size of the equipment is reduced as well as the production of polymerization gasoline. Decision as to the degree of recovery must rest on suitable economic basis for any particular local condition. Ordinarily, it appears economical to use a flow sheet substantially as shown here since the propane refrigeration required is available as an incremental cost only beyond that already required in the casinghead plant.

Local conditions may dictate that the bottoms from the primary tower may be further refined more economically in a fashion otherwise than is indicated on the attached flow sheet. In this connection it is, of course, possible that the stabilization only of the polymerization gasoline may preferably be carried out in a separate unit rather than jointly with the natural gasoline.

From the plant designs and the discussions presented in this paper, the most important advantages of combining low temperature natural gasoline recovery with thermal polymerization may be set up as follows:

(1) Simple and inexpensive production of liquid feed for polymerization.

As has been shown, suitable processing in the recovery unit accomplishes this quite readily by total condensation of the stabilizer overhead with cooling water only.

(2) High propane and butane recovery in polymerization unit.

It has been indicated that the combined unit permits efficient use of existing refrigeration equipment for the purpose of obtaining high propane and butane recovery as liquid.

(3) Economical common use of equipment.

Stabilization and refrigeration equipment, with accessories, are used in common, as well as instrumentation, controls, and piping. This results in considerable economies both in first cost and in operation.

(4) Low operating labor requirements.

Experience has shown that operation of the refrigeration type casinghead plant is very simple, and needs little labor. The polymerization unit is likewise simple, and, consequently, more efficient use of labor is possible when the two plants are combined.

Economic Considerations

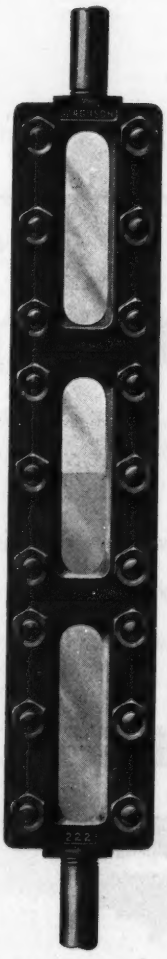
In a general discussion it is difficult to include economic analyses since these are so profoundly influenced by local conditions such as plant location, relative values of gasoline and gaseous BTU, size of plant, existing equipment, cost of water, steam, and fuel and many other considerations. However, it is felt that some figures taken from the design discussed in this paper will be of value.

The plant capacity has been considered as 50,000,000 cubic feet (Standard Conditions) per day. Consequently the production of natural gasoline was about 50,000 gallons per day and that of polymerization gasoline about 25,000 gallons per day,—both being 22-lb. Reid vapor pressure product. The utilities required for the combined plant were as follows:

Steam	650 BHP
Water	8,000 G.P.M.
Fuel Gas	1,250 000 cu. ft./day (Not including boiler fuel)
Propane Compressors	1400 HP
Electricity	Lighting Only
Operating Labor	4 Men Per Shift

Using these figures as to capacity, yields, utilities, and labor it develops that the entire capital outlay for this combined plant is returned in from one-an-one-half to two years.

JERGUSON



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This capital return is after all operating charges but does not include any fixed charges. Further, it is based on a price of 5c per M for 1100 BTU gas, and a value of 6.25c per gallon for 22-lb. Reid vapor pressure gasoline.

In this specific case the natural gasoline is now being recovered and therefore, in the above capital return, net revenue is included from the polymerization gasoline **only**, while the capital expenditure considered is the **total** required to convert the existing equipment into the combined casinghead and thermal polymerization unit described. Actually, of the existing plant, chiefly the water cooling tower and the boilers, with their accessories, were considered as of value in the combination operation. Therefore, for these and other reasons, this is definitely a special case. However, this will undoubtedly be true in many situations, and it is therefore felt that the economic possibilities of the combined casing head and thermal polymerization plant warrant extremely careful consideration by California producers.

Summary

Briefly, the contents of this paper may be summarized as follows:

(a) A new type of plant for natural gasoline recovery has been discussed. This includes freeing the feed gas of its water vapor, cooling the dried gas by propane refrigerant to such a temperature that all the desired constituents are liquefied, and stabilization of this highly volatile liquid.

(b) Operating results of a plant of this kind are given. For six months the Duval Gasoline Company, at Benavides, Texas, has operated in this manner, processing from 6,000,000 to 6,500,000 cubic feet per day at 50- to 60-lb pressure and producing therefrom 18.4-lb. Reid vapor pressure gasoline in the amount of about 14,000 gallons per day. Important operating data as to analyses, qualities, pressures, and temperatures are tabulated.

(c) A design of combination casinghead recovery and thermal polymerization unit has been discussed. This included:

1. Dehydration of feed gas.
2. Recovery of casinghead gasoline by the refrigeration process and at 400-lb. pressure.
3. Production, in the recovery unit, of liquid feed for thermal polymerization.
4. Thermal polymerization unit.

(d) The inherent advantages of the combined operation are presented. These involve inexpensive production in the recovery unit of the liquid feed for the polymerization unit and more efficient use of plant equipment and labor.

(e) Economics for one case of such combination unit are indicated. Necessary utilities are given as well as other economic figures. This indicated, after operating charges, a capital pay-off of from one-and-one-half to two years.

New Kimball Krogh Hi-Pressure Pump

A new two-stage, multiple duty, high pressure type "MKE" pump, capable of pumping any liquid against high heads, has been announced by the Kimball Krogh Pump Division of Victor Equipment Co., 1010 E. 62nd St., Los Angeles, Calif.

This two-stage pump and motor are built integrally as a unit and mounted on a common shaft, for installation vertically, horizontally or in any other desired position. According to the manufacturer, the installation occupies only about half the space required by a conventional multi-stage pump and motor. There are no flexible couplings.

The one-piece carbon steel pump shaft is carried on two ball bearings located within the motor and is protected against wear by a removable wearing sleeve. Instant access to wearing parts is possible without breaking either suction or discharge connection. Standard capacities are from 75 g.p.m. to 1000 g.p.m. at heads from 200 to 800 ft., but the head capacity may be increased, when necessary to specification.

Complete mechanical specifications, a table of capacities, and other data on this new pump are given in Bulletin No. 150, obtainable from the manufacturer upon request.

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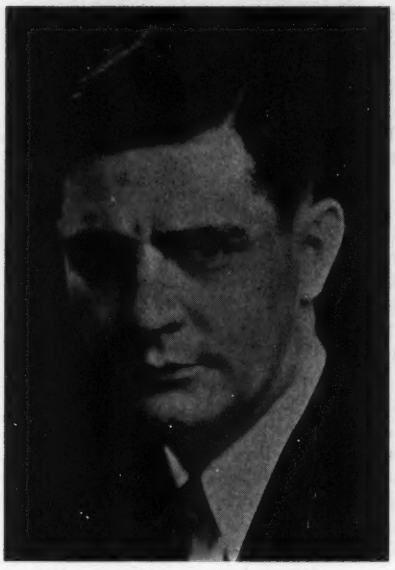
Glacier Priest Tells Of Latest Adventure

Returning from a year and a half in the far reaches of Alaska, Father Bernard R. Hubbard tells of his most recent expedition while visiting with P. E. Allan, domestic sales manager, left, and Harold R. Deal, advertising and sales promotion manager, right, of Tide Water Associated Oil Co., Associated Division, at the company's San Francisco headquarters. Father Hubbard, whose recent expedition to King Island near the Arctic Circle proved one of the most revealing in all of the famous "Glacier Priest's" explorations, was congratulated by Mr. Allan and Mr. Deal for his world record trip in a skin covered boat. Father Hubbard, accompanied by eight men, including six Eskimos, made a two thousand mile voyage over open sea in an oomiak, powered by two Johnson outboard engines, in the record time of five weeks. The forty-foot craft of seven foot beam, made from drift wood and covered with five walrus skins, carried, aside from the nine men, two dogs and four tons of supplies. During their journey they made one non-stop run of 200 miles in forty hours which also established a record for travel with outboard engines. Associated Flying-A gasoline and Veedol motor oil were used exclusively. Father Hubbard is now making a lecture tour of the nation, showing motion pictures of his activities on King Island.

Bulk petroleum shipments from Los Angeles Harbor during the week ended September 17 totaled 1,270,920 bbls., an increase of more than 300,000 bbls. over the total for the previous week.

Chain Belt Names Gardner Treasurer

Chain Belt Co. of Milwaukee has announced the election of Fred V. Gardner as acting treasurer to fill the vacancy created by the recent death of C. L. Pfeifer, and the election of John T. Brown, vice-president to the board of directors. G. M. Dyke, assistant treasurer, was reelected and A. F. Kessler, chief accountant, was elected an assistant treasurer.



Fred V. Gardner

Mr. Gardner, who has been connected with the company since early in the year in a consulting capacity, was formerly associated with General Electric Co. at Schenectady, as supervisor of budgets, where he received the Coffin Foundation Award given yearly to the employe who performs the most outstanding service for the furtherance of the industry. He is a graduate of the University of Missouri and the Harvard Business School.

Mr. Brown has been associated with the Chain Belt Co. since 1924, first as a student apprentice and then successively as production manager, works manager and since 1936 vice-president. He is a graduate of Yale University.

Mr. Dyke has been connected with the company since 1923, and shortly thereafter was made vice-president of the then newly acquired Stearns Conveyor Co. at Cleveland. When the Cleveland operations were merged with the Milwaukee operations in 1933, Mr. Dyke returned to Milwaukee to become assistant treasurer.

Mr. Kessler joined the organization in 1923 and has been chief accountant for the last ten years.

The company, founded in 1891, has plants in both Milwaukee and West Milwaukee and manufactures a complete line of chain, conveyor and power transmission equipment; construction equipment, such as: contractors pumps, mixers, pavers, etc.; and sewage disposal equipment.

A decision of the Washington supreme court has held that the Washington Use Tax was designed to protect Washington merchants against non-resident competitive merchants and does not apply to articles purchased outside the state which are neither manufactured nor available for purchase within the state.

Loading the first shipment of the new type bell and spigot oil well casing, developed and manufactured exclusively by Jones & Laughlin Steel Corporation, Pittsburgh. The bell, formed by a die forging operation, has many advantages over conventional expanded type bells, and the pipe is made of especially selected steel, the manufacturer says.

Father Bernard R. Hubbard, the "Glacier Priest", center, is shown here discussing his recent 2000-mile trip in a skin covered boat on the open sea. At his right is P. E. Allan, domestic salesmanager, and at his left, Harold R. Deal, advertising manager, Tide Water Associated. It would appear that the Associated men are hearing good news.

Olson and O'Donnell Land Leasing Bills

Promise Confusion on Repealing Angle

All of the elements of a first-class mix-up for the oil industry are present in the possibility that either or both the Olson and O'Donnell state land leasing bills will be ratified in the referendum of Nov. 8.

The state has already leased parcels for 87 drill sites, with 10 more under way, under the State Land Leasing Act, passed in the special session of the Legislature early in 1938, and is proceeding on the assumption that all acts taken under the terms of this law will stand, even though the Olson or the O'Donnell bill may be ratified. In spite of that assumption, however, there is at least some legal opinion that if one or both of the bills pass, considerable litigation will immediately result.

The problem hinges around the question of dates of effectiveness. Both the Olson and O'Donnell bills were passed by the Legislature during the regular session in 1937, and both were immediately held up by referendums. Both bills, as is customary, carry clauses that they amend or repeal all conflicting sections in preceding legislation, as does the State Lands Leasing Act.

If, then, the Olson bill is ratified on Nov. 8, and becomes effective as of that date, it repeals the State Lands Leasing Law. The same statement applies to the O'Donnell bill.

If, however, the Olson law is ratified on Nov. 8 but becomes effective as of the date of its passage by the Legislature, the State Lands Leasing Act, being the subsequent legislation, remains in effect with no amendments or changes. The same conditions apply to the O'Donnell bill.

Another "if." If both the Olson and O'Donnell bills are ratified at the polls, which is not beyond the bounds of possibility, and they both become effective as of the date of ratification, which is the first and which the second of the two measures? In other words, will the O'Donnell bill repeal the Olson bill, or vice versa?

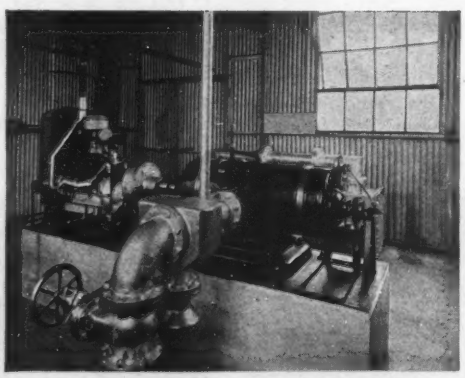
The question may of course be purely academic. It is quite possible that neither the Olson nor the O'Donnell bill will be ratified, in which event the State Lands Leasing Law remains the sole law under which the state will grant leases.

Method of Cleaning Diesel Crank Cases

A new, improved method of cleaning Diesel engine crank cases that makes possible substantial savings in time and effort is announced by Oakite Products, Inc., New York, N. Y. It is said the new method eliminates the laborious, time-consuming scraping and wiping of surfaces associated with previously used hand methods.

The method is based on the use of a recently developed cleaning material known as Oakite Composition No. 9, an oil soluble emulsifier reported to be especially designed to quickly and effectively remove sludge, grease and carbonized oil deposits. It is mixed with kerosene or light fuel oil.

After the mixture has been sprayed on crank case surfaces, it is allowed to soak, during which time grease and other accumulations are thoroughly softened and loosened.



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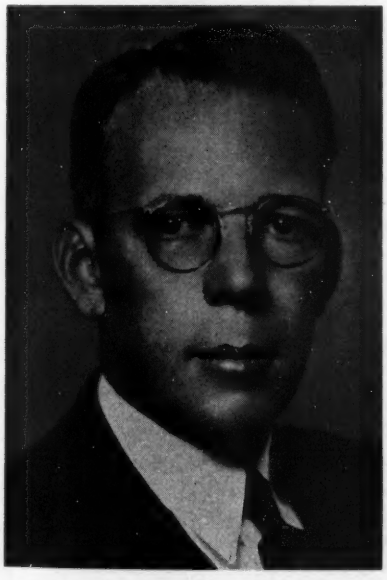
Assign New Duties To S. F. Remmel

S. F. Remmel, who for the past several years has been assistant to Frank Champion, General Sales Manager for the Oil Tool Division of Byron Jackson Co., recently has taken over additional duties in connection with export sales of BJ Drilling and Production Tools.

S. F. Remmel

Another change just announced is the appointment of W. C. Langley who will cover Trinidad, Venezuela and Colombia for Byron Jackson and other concerns. John H. Baird, at 420 Lexington Avenue, New York, continues as Export Representative.



Earle W. Gard

Earle W. Gard has been made director of research and development of Union Oil Co. of California.

L. G. "Pat" Robinson On Trip for Security

L. G. "Pat" Robinson, formerly Division Manager, San Joaquin Valley, for Security Engineering Co., Inc., Whittier, Calif., is taking an extended survey trip throughout Illinois, Oklahoma and Texas in the interests of Security Engineering Co., Inc. While in Texas Mr. Robinson will inspect the site of Security's new division office and warehouse on Navigation Blvd. in Houston, plans for which have already been completed.

L. G. Robinson

H. F. Sutton, a member of the Security Engineering Co., Inc. sales department for the past five years, will be transferred to Houston as division manager there.

H. E. Thompson has joined Security's sales department at Whittier and will act as contact man for this division. Mr. Thompson received his training and experience through many years' association with the oil business prior to his affiliation with Security.

California Crude Oil Production

For Two Weeks Ending October 8, 1938

	October Daily Quota	Average Daily Production	Excess
San Joaquin Valley			
Belridge—North	14,495	12,280	*2,215
Belridge—South	1,895	1,019	*876
Buena Vista	17,105	17,410	305
Canal	3,355	2,964	*391
Coalinga-East(Eocene)	1,173	1,334	171
Coalinga—East-West	15,972	9,927	*6,045
Coffee Canyon	2,960	3,292	332
Edison	2,495	2,436	*59
Elk Hills	7,345	10,201	2,356
Fruitvale	7,195	8,276	1,081
Greeley	3,135	3,246	111
Kern Front	7,075	7,606	*369
Kern River	5,533	2,359	*3,171
Kettleman No. Dome	60,490	62,990	2,500
Lost Hills	4,285	3,317	*968
McKittrick	3,430	3,173	*257
Midway	42,953	36,417	*6,513
Mount Poso	14,060	14,181	121
Mountain View	8,920	9,598	678
Rio Bravo	4,810	7,572	2,762
Round Mountain	9,625	9,933	308
Ten Section	8,515	8,398	*117
Wasco	373	377	4
Other Fields	2,177	2,159	*18
TOTAL	250,765	240,495	*10,270
Coastal Counties			
Elwood	5,045	5,100	55
Rincon	2,845	3,183	338
Santa Maria	5,940	3,069	*2,871
Gato Ridge	2,495	2,418	*77
Santa Maria Valley	19,590	13,780	*5,810
Santa Paula-Newhall	4,930	5,327	397
Ventura Avenue	31,790	33,871	2,081
Other Fields	5,965	6,118	153
TOTAL	78,600	72,866	*5,734
Los Angeles Basin			
Alamitos-Seal Beach	7,655	7,648	*7
Brea-Olinda	8,395	5,463	*2,932
Coyote—East	2,665	3,402	737
Coyote—West	7,990	8,072	82
Domingues	20,220	25,634	5,414
El Segundo	5,015	6,442	1,427
Huntington Beach—New-Old	26,425	30,817	4,392
Inglewood	13,520	13,248	*272
Long Beach	43,645	55,551	11,905
Montebello	6,297	6,520	223
Montebello-West End	3,113	6,203	3,090
Playa del Rey	5,210	5,876	666
Richfield	7,800	8,284	484
Rosecrans-Athens	8,000	14,602	6,602
Santa Fe Springs	28,795	30,689	1,894
Torrance	14,380	19,427	5,047
Wilmington	69,120	94,230	25,110
Other Fields	2,590	2,919	329
TOTAL	280,835	345,027	64,192
STATE TOTAL	610,200	658,388	48,188

*—Shortage.

Westinghouse Earmarks Self Cleaning Bearings

Because so many electrical maintenance men periodically dismantle motor ball bearings to clean out old grease, a red tag is now attached to Westinghouse grease lubricated ball bearing motors stating that this practice is unnecessary. The motor bearings are self cleaning, being provided with an overflow sump into which the used grease is automatically deposited.

On the tag, a cross section of a bearing shows how fresh grease forces the old into the sump. Excess or used grease is easily removed through an opening equipped with removable plug. The overflow sump also provides a pressure relief which prevents overgreasing when the simple instructions accompanying the motor are followed.

This information had been contained in the instruction booklet accompanying each motor, but a survey of installations has shown that the older practice is still prevalent. The red tag is expected to earmark each motor so that all maintenance men will soon know that improved design saves them a good many hours work annually.

F. W. LAVERTY T. C. WEBB F. J. JOBST

Clark Bros. Announces Technical Service Division

Mr. J. B. O'Connor, Vice President of Clark Bros. Company, Olean, N. Y., has announced the formation of a new department of his company to be called the Technical Service Division. This department will correlate the field and shop engineering of the company, and have charge of all process design problems, making a study of the various oil production and refinery problems so that the equipment manufactured by Clark Bros. Co., will be designed to suit the customer's process.

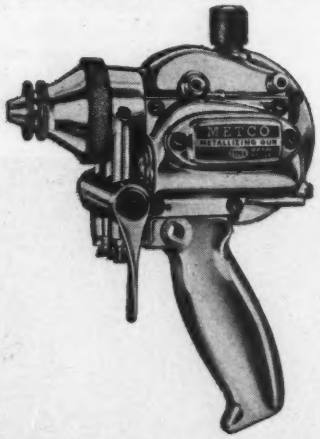
The department will be in charge of F. W. Laverty, who has been associated with Clark Brothers Company for twelve years, and is considered one of the outstanding men in the field of thermodynamics. Mr. Laverty will have associated with him in his Olean office, Dr. T. J. Chrzan and W. D. Bathurst.

At the company's Tulsa office the department will be under T. C. Webb, who formerly was associated with the Bureau of Mines, and has also had considerable experience in the design of natural gasoline recovery plants.

F. J. Jobst will represent this department in the company's New York office. H. J. Turner, formerly with the C. F. Braun Corp., a new addition to Clark Brothers staff, will be located at Dallas.

New Metallizing Gun

The metallizing process is applied in the restoration of worn machine parts of all kinds, such as bearing surfaces, rolls, shafts, pump rods, press fits, repairing defects in castings, etc., with carbon steels, stainless steels, bronze, brass



monel metal, nickel and other metals. It is also widely used for the application of corrosion resistant coatings of zinc, aluminum, lead, tin and other metals, to all types of equipment ranging from nuts and bolts to steel bridges and water tanks. Aluminum coatings have proved successful in retarding heat corrosion or oxidation on exhaust manifolds, furnace parts and similar equipment.

The process is widely used in the oil industry for building up worn machine parts, for the application of aluminum coatings to pressure vessels to resist hydrogen sulfide corrosion, and to apply other corrosion resistant coatings to storage tanks, gas tanks and other equipment.

Metal wire is fed into a special gun at an adjustable speed, where it is melted by means of oxy-acetylene or oxy-hydrogen flame, atomized by compressed air and sprayed on any base material. The gun may be used as a hand tool for coating large structures with zinc, aluminum, lead or other metals, or as a lathe tool for building up worn shafts, rolls, plungers, etc., with steel, stainless steel, monel metal, bronze or any other metal obtainable in wire from.

With the Type E Metco Metallizing Gun extremely fine coatings are obtained at production speeds, and this combined with simplified adjustments, permits continuous operation with maintained speed and quality. Improved nozzle and jet construction reduce gas consumption and result in the deposit of a maximum amount of the metal sprayed, thus giving maximum efficiency and economy the manufacturers say.

The complete tool is extremely light, weighing only 3¾ lbs. The gear case is made of heat treated Dowmetal and is completely sealed. Simple two-piece case construction combined with removable drive gear and roll make the unit easy to clean and inspect.

Langley to Represent Oil Tool Manufacturers

W. C. Langley will return this week to Trinidad to represent American Iron and Machine Works Co., Byron Jackson

W. C. Langley

Co., Elliott Core Drilling Co., Lane-Wells Co., and Security Engineering Co., Inc., in Trinidad, Venezuela and Colombia.

Mr. Langley, for the past ten years, has been connected with the Standard Oil Co. of Venezuela, on standardization and materials work, both in Trinidad and Venezuela. Prior to that time he was for three years engaged in actual field work in Southwest Africa for the Sinclair interests.

After Nov. 1, 1938, Mr. Langley will make his headquarters in Port of Spain, Trinidad.

Lane-Wells Dividend

Directors of Lane-Wells Co. yesterday declared a dividend of 30 cents a share on the common stock, payable Nov. 1 to stock record Oct. 25. In July, a dividend of 30 cents a share was also paid on the common stock.

Decreasing only 61 from July 1938, California oil industry employment in August was 52,509, according to an estimate of the California Oil and Gas Association.

How to get the MOST in Pumping Service at the LOWEST Cost per Barrel

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You can't fight sand. Close-fitted pumps can't stand up in service where sand conditions prevail. Pumps fill up, plungers freeze, close-fitted parts are soon scored and worn beyond the point of usefulness or hope of repair. Frequent pulling jobs, down-time and maintenance expense eat heavily into profits.

Years of economical service in sandy wells have proved the value of the Fluid Packed principle to operators all over the world. Two concentric traveling tubes, connected together at their upper ends, reciprocate over a stationary standing tube loosely fitted between them. The long annular channels between the tubes become filled with the fluid being pumped—the "fluid packing" that never wears out—and the liberal clearance provided allows even large quantities of sand to be carried with minimum wear or abrasion. The loose fit between the tubes reduces friction, avoids freezing, and lessens the hazard of rod breakage by permitting the plunger to conform quickly to rod movement. These factors greatly increase pump life, reduce down-time and pulling jobs, and insure uniformly efficient pumping service.

The same qualities that make Fluid Packed Pumps efficient and economical in sandy wells insure exceptional service from them under many other conditions also. Give them a trial—there is a size and type to meet your needs.

Use FLUPACO Groove Seal PUMPS In Ordinary Wells

Flupaco Petrol A

Flupaco "Volume Producer"

Flupaco Groove Seal Pumps depend on uniform close fit between the plunger sleeves and the barrel tube throughout the ***entire length of the stroke*** to establish and maintain their reputation for long, efficient service life and economy. The plunger sleeves are ground to extreme accuracy and operate in specially fabricated cold-drawn seamless steel tubes selected for hardness, roundness, precision, and ***uniformity of dimension*** from end to end.

Flupaco plunger sleeves are made of specially processed and heat treated chrome-molybdenum iron with the physical properties that insure high resistance to wear and abrasion. They are available in two standard, uniform grades: "Supreme," harder and especially suitable for severe conditions, and "Service," lower in price—the best buy for general use.

Among the three pumps in the Flupaco Groove Seal group you will find the one to meet your needs. The "Volume Producer" is made in long lengths for service in deep, large volume wells; the "Producer" is used in wells of medium depth and volume. And the little Petrol A, exceptionally low priced but a precision pump all the way through, is specially designed for use in stripper wells where both initial expense and operating costs must be held at the minimum.

Install one or more of these Flupaco Groove Seal Pumps. Give them a real test, keep a close record of costs and performance. You'll find that the quality built into them pays dividends in lower lifting costs over a longer period, with reduced down-time and repair.

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(*Continued from page 16*)

"TABLE 9 (WIGGINS)

"Results of Comparative Evaporation Tests on Three Lease Tanks with Varying Degrees of Tightness

"Tank	Total Time (Days)	Time Actually Receiving Oil (Days)	Time Not Receiving Oil (Days)	Average Atmospheric Temperature (Deg. F.)	Quantity Evaporated (Barrels)	Quantity Evaporated (Average Per Cent of Volume	Change in Gravity From (Deg. API)	Change in Gravity To (Deg. API)	Change in Gravity Loss (Deg. API)
LOSSES DURING FILLING									
'Open'	5	2	3	37	14.4	5.97	40.73	38.27	2.46
4-in. vent	5	2	3	37	6.0	2.55	40.73	39.70	1.03
Small vent ..	5	2	3	37	4.5	2.03	40.73	39.90	0.83
LOSSES WHILE STANDING FULL									
'Open'	5			49.4	9.2	4.00	38.27	37.17	1.10
4-in. vent	5			49.4	2.8	1.26	39.70	39.37	0.33
Small vent ..	5			49.4	1.8	0.79	39.90	39.59	0.31"

used to cool the oil to atmospheric temperature before it goes to storage. A number of relatively new "unit treaters" possess these attributes, and definitely show material savings in treating crude. They also have further advantages in that they dispense with the use of separators, and permit the gasoline plants to secure the rich vapors evolved in treating. Records kept on 30 "unit treaters" in the Seminole area, as compared to 10 conventional systems in the same field, showed that the unit treaters had saved from gravity and volume alone approximately $6,000 for six months—and this saving was made during the time in which, for certain operating reasons, no pressure was carried on the treaters. Comparative tests made with 5- to 9-lb. pressure on the unit treaters showed that the above saving would have been greatly increased had pressure been maintained during this period.

The use of high-temperature treating to secure a saving in chemicals, as mentioned before, has been practiced to a large extent. In many instances, treating methods requiring relatively high temperatures were established during the flowing life, and were continued into the pumping phase without lowering the temperature. A careful investigation in the Seminole area showed that the production on many leases could be "cold-treated" (atmospheric temperature) with but a slight increase in the cost of chemicals. Records kept on these treating operations for one year have resulted in an estimated over-all saving of $36,572 on 1,165,224 bbls. of oil treated, which is an average of 3.1 cents per barrel.

It was found that "cold-treating" was not applicable to oil from all districts; but it was found that, even in these districts, treating temperatures could be considerably lowered. The beneficial results secured in one district are shown in Table 4.

Another example of preventable losses that have occurred on leases, and that are still occurring on some leases, is shown by work that was done in a Rocky Mountain field in 1935. Tanks that had been in use several years and, consequently, were far from tight were made semi-gas-tight. The steaming method of treating was discarded and replaced by fluid heaters—in some instances small boilers—together with "Wash" tanks which had wood baffles. The heaters in most cases heated the water in the bath of the wash tank which, in turn, heated the fluid produced by the wells. When tanks were steamed, a close control of temperature was not kept which, together with non-tight tanks, means a considerable loss of

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vapors. With the tight tanks and a different method of treating, temperatures were closely controlled; and, by a system of overhead venting with pressure and vacuum valves, the vapors that were released by the necessary heating were saved for the gasoline plant.

In a great many cases the gravity was increased 2 deg., and in some cases as much as 3 deg., after the changes were made. Changes had been made in systems that handled 2,576 bbls. of oil daily, with a consequent average increase in gravity from 34.5 deg. to 35.8 deg., or 1.3 deg. This represents an additional revenue for the oil of at least 2 cents per barrel, or $51.52 per day; and represents a volume increase of 3.4 per cent, or 87 bbls. daily, which had a value of $104.40. Thus, a gain of $155.92 daily, or $4,677.60 per month, was obtained. The results above are based on several months' operation during corresponding seasons of the year before and after the changes were made. There was a considerable saving in chemical also; however, this saving of chemical should not be emphasized, as attempts to save chemical so often result in greater losses elsewhere.

The value of vapor-tight tanks alone in reducing evaporation losses is well shown by tests given by Wiggins in his "Methods of Decreasing Evaporation Losses of Petroleum," Technical Paper No. 319, U. S. Bureau of Mines, 1923, and which is quoted here from U. S. Bureau of Mines Bulletin No. 379:

"The value of vapor-tight tanks alone in reducing evaporation losses is shown by tests made in 1920-21 by Wiggins to determine the effectiveness of vapor-tight tanks in reducing volumetric loss and lowering of the gravity of oil by evaporation. Three tanks of various degrees of tightness were used in one test: 1, an open tank with an ordinary sheet-steel roof (without gaskets between the roof seams) equipped with an 18-in. manhole in the center, and two 8-in. gage holes without covers; 2, a tank with a sheet-steel roof, equipped with one 4-in. vent 6 ft. long, with gaskets along all seams and around the chimes, and bolts spaced about 3 in. apart; 3, a small vent tank fitted with an automatic pressure and vacuum regulator, with a roof of heavier metal than those of the other two tanks, gaskets along all seams and around the chimes, bolts about 2 in. apart. In the open tank, the oil was allowed to splash in through the manhole; but in the other two the oil line was flanged to the top.

"The results of this test are given in Table 9. The data show that a loss of about 6 per cent occurred during the filling of the open tank, and that this loss coincides with a loss in gravity of the oil of about 2.5 deg. API. The results show also that the tighter the tank, the less loss in volume and change in gravity—as the losses in the small vented tank were only about one-third of the corresponding losses in the open tank. Tests on these tanks while standing full show even greater savings for vapor-tight equipment."

Schmidt[1] states that tests have shown that the use of welded tanks with from 12- to 16-oz. pressure will incur only about one-third of the loss sustained in tight bolted tanks. It appears, then, that the logical tanks for lease storage would be welded tanks, where the size of the production does not make their use infeasible. This is particularly true where old 55,000-bbl. tanks are available for furnishing steel with which to manufacture welded tanks, inasmuch as the construction cost is relatively low. Welded tanks make an extremely flexible type of storage, as these tanks can be moved and set up quickly for about $25 each; whereas it costs $175 to move and erect a low 500-bbl. bolted steel tank. A check in different areas has shown that approximately 1 deg. of gravity is saved by using the welded tanks. Replacing large tanks erected on leases during flush production, with small vapor-tight tanks commensurate with production, has resulted in considerable savings. These

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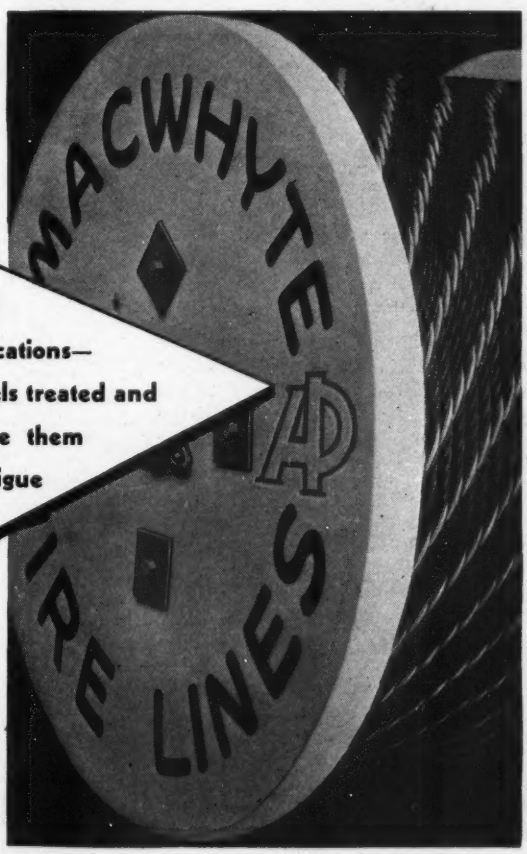

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TABLE 4

Reduced Temperature Treating—J. Pool, Seminole Area

Month	Year	Oil Treated (Barrels)	Chemical Cost (Per Barrel)	Average Price (Per Barrel)	Average Gravity (Deg. API)	Treating Temperature (Deg. F.)	Total Gain (Dollars)	Gain Per Barrel (Dollars)
February	1937	74,531	$0.0092	$1.119	31.5	180	Base	Month
March		81.905	0.0103	1.131	32.0	160	$2,082	$0.025
April		76,700	0.0120	1.138	32.4	140	3,238	0.042
May		76,615	0.0121	1.138	32.4	130	3,229	0.042
June		69,929	0.0110	1.135	32.3	120	2,610	0.037
July		69,384	0.0110	1.136	32.4	120	2,857	0.041
August		65,799	0.0111	1.134	32.2	110	2,196	0.033
September		60,919	0.0111	1.133	32.2	110	1,969	0.032
October		62,313	0.0109	1.138	32.3	140	2,515	0.041
November		57,185	0.0079	1.142	32.5	150	3,065	0.054
December		58,001	0.0091	1.141	32.5	150	2,959	0.051
January	1938	55,647	0.0098	1.141	32.4	150	2,643	0.048
February		46,518	0.0099	1.138	32.3	150	1,930	0.042
March		48,836	0.0076	1.129	31.9	150	1,134	0.023
Total and Average		829,561	0.0105	1.136	32.3	140	32,427	0.039

TABLE 5

Dates (Inclusive)	No. of Tank	Condition of Tank	Temperature (Deg. F.) Maximum	Minimum	Range	Difference
July 1-11, 1929	701	Insulated, but not painted	103.3	79.2	24.1	
	703	Not insulated nor painted	108.7	78.7	30.0	5.9
July 13-25, 1929	701	Insulated and painted	104.2	82.2	22.0	
	703	Not insulated nor painted	116.2	81.7	34.5	12.5
July 27-August 3, 1929	701	Insulated and painted	108.1	85.6	22.6	
	703	Painted only	109.6	84.3	25.3	2.7

savings are easily understood when it is observed that breathing losses are considerably greater on partly-filled tanks than on full tanks, and are almost a direct function of time for relatively short periods under any uniform set of conditions.

The use of overhead vent systems and stack valves on risers has resulted in saving considerable gravity on storage tanks, and this is particularly true on bolted tanks. Accurate figures on 8 installations on bolted-tank batteries that cost approximately $100 per unit showed an average monthly saving of $65 each during four months of operation. These savings were computed by comparing the increased gravities, and consequent decreased volume losses, during these months with the gravities secured during the same months of the year previous to the installation, with no changes in production methods having taken place.

Painting of lease storage with light-colored paints has a material effect on the gravity of the oil delivered to the pipe line. A test made by one of the major oil companies during the summer of 1929 on two 55,000-bbl. tanks shows the effect of painting and/or insulation, and illustrates the fact that painting is practically as efficient as insulation alone. Two tanks, No. 701 and No. 703, built exactly alike, were used with approximately the same amount of oil in each tank. No. 703 was uninsulated and unpainted, and No. 701 insulated with ½-in. celotex and unpainted at first, but both painted at later steps of the experiment. Recording thermometers, with their bulbs placed in the vapor space in each of these tanks, kept a constant record of the temperatures. Although actual breathing losses were not measured, they are a function of the average temperature and the temperature range of the vapor space. Data are shown in Table 5.

Transportation

Pipe-line losses are principally incurred by air that is allowed to enter gravity gathering systems and then later expelled with its load of vapors at the gathering stations. The authors have actually observed suction pumps at the pipe-line stations bringing in only air out of the lines for a period of as long as one hour. However, in recent months, one pipe-line company has installed a successful shut-off valve on all leases from which they are taking oil. This valve, invented by one of its operators, has practically eliminated this loss.

Another loss in pipe-line transportation is the filling loss occasioned in filling cone-roof working tanks. A careful estimate of the losses determined at one pipe-line gathering station during the summer months and a similar series of experiments carried on during the winter months showed that this particular station could expect to lose from volume alone some $35,000 in filling losses in handling 9,000,000 bbls. of oil, at least $30,000 of which could be saved by installing floating roofs on working tanks at a cost of $9,000, which would leave a net saving of $21,000.

A batch of 41-gravity crude was followed through a whole pipe-line system equipped with floating roofs; and the results, determined by air "equilibruim vapor-pressure method on composite samples," * showed that 0.122 per cent loss was sustained on this batch in passing through eight pumping stations, whereas the same batch, in passing through one receiving station of another pipe line having a cone-roof tank sustained a loss of 0.093 per cent. It was interesting in this experiment to note that the calculated equilibrium loss of filling the cone-roof tank with this batch, using the average temperature that existed, was 0.129 per cent. This information tends to disprove the idea held by some that filling losses are greatly minimized by the fact that the evolved air fails to approach its maximum vapor-carrying capacity.

Conclusion

It appears that a great many things may be done to conserve gravity, with its consequent saving of volume. Knowledge of most of these things is general. However, it is apparent that many producers do not follow the best practices, particularly during periods of flush production. While it is true that many major problems present themselves during new or flush production periods, it does seem that, with the small expenditures and work required to institute gravity-conservation methods and equipment, this could be done, in a large part, during the routine work of installing tankage, treaters, and other equipment for producing, handling, and storing petroleum. If it is worthwhile to make changes in existing equipment—which has been shown—it is certainly worthwhile to make original installations correctly. The benefits to be obtained by the oil industry as a whole mount into millions of dollars, and in this day of slower return of investment they assume considerable importance.

* Composite sample taken of batch at starting point and vapor pressures determined with various per cents evaporated for a vapor pressure vs. per cent evaporated curve. Applying vapor pressure of composite sample at receiving end gave per cent lost.

Bibliography

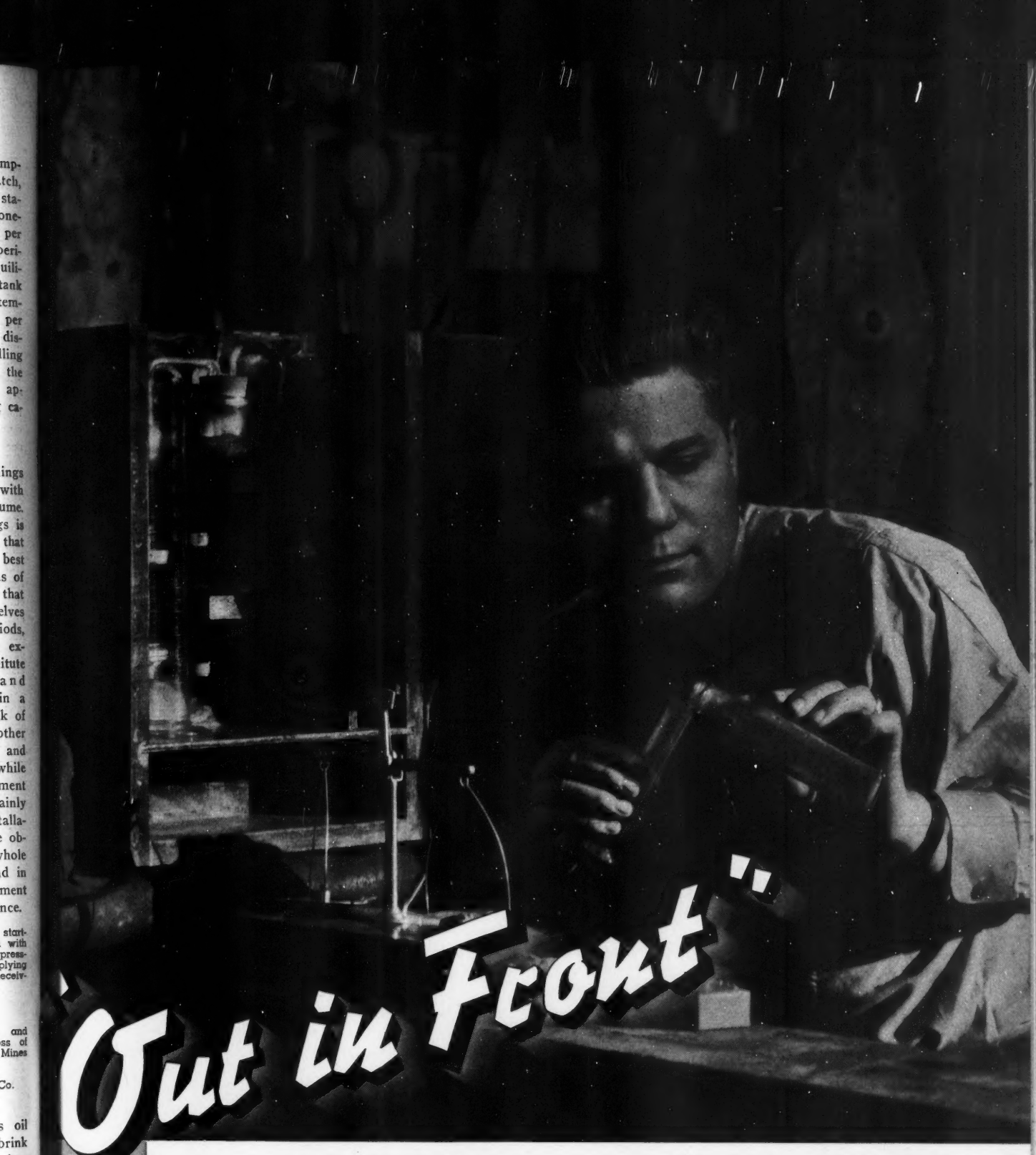
[1]Ludwig Schmidt, "Applied Methods and Equipment for Reducing Evaporation Loss of Petroleum and Gasoline," U. S. Bureau Mines Bull. 379 (1934).

[2]Roberts, Dynamic Dispersions.

[3]I. S. Salnikov, Report of The Carter Oil Co.

Private motor carriers, such as oil company tank trucks, are on the brink of some sort of government regulation, according to K. F. Witchester, chairman of the American Petroleum Institute Automotive Committee.

In affirming an administrative ruling of the Bureau of Motor Carriers, the Interstate Commerce Commission has held that common and contract carriers cannot join with each other in arrangements for interchange of traffic for through transportation.



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Field Development

Los Angeles Basin

Superior Rosecrans Flows 2054 Bbls.

Flowing at the rate of 2054 bbls. a day, Superior Oil Co.'s Maxwell Community No. 11 was completed as the largest producer in the southern section of the field. Bottomed at 7676 ft. and with perforations open below the shoe of the water string at 7595 ft., the big well yields clean 31.1 gravity oil. Derrick has been erected for well No. 12 on the lease.

H. B. Oil Co. well No. 1 on the Rosecrans lease at the southwest corner of Figueroa and Rosecrans Ave. swabbed salt water on a production test and is trying to pull the liner to recement 7-in. casing at 7635 ft. Total depth of the hole is 7830 ft.

Union Oil Co. failed to shut off water with the first cementing of 8⅝-in. casing at 7393 ft. in Rosecrans No. 26 and is testing a second job. If an OK is received, the hole will be cleaned out to bottom at 7700 ft., and the well completed.

In the south portion of the field, Bankline Oil Co. and F. E. Fairfield wells are redrilling while Hydro-Carbon Products Co. is preparing to drill on the Van Nuys lease. The latter company is headed by J. F. Holbrook and L. E. Maxwell.

Western Gulf Oil Co. is drilling its semi-wildcat, Bagg No. 1, below 4600 ft.

Torrance-Lomita Play Moves East of Narbonne

With activity in the Lomita portion of the Torrance field settled to a routine pace, interest centers largely in the area east of Narbonne Ave. where several small wells have been completed. Most recent of these are L.M.S. Oil Co. (Lebow) Ellis No. 1 at 235th and Eshelman, a 200-bbl. well cutting 8%, Alford & Thomas Fee No. 1, a 140-bbl. clean pumper, and Sunny State Oil Co. (Tom Bailes), Bateman No. 1.

The L.M.S. well was bottomed at 5130 ft. and is producing the interval below the shoe of the water string at 4805 ft., including both upper and lower Del Amo zones. Alford & Thomas cemented 5¾-in. casing on bottom at 5120 ft. and gun perforated by stages below 4980 ft.

Sunny State, after overcoming mechanical trouble, bottomed at 5140 ft., and completed as a small pumper from approximately 300 ft. of zone. The well is located on 238th St. near Eshelman and is on approximately the same sub-surface contour as L.M.S.

Louisiana Oil Co. deepened the abandoned Texas Co. Lord No. 2, to 5135 ft., cemented casing on bottom after gun perforating below 4950 ft., is testing for production.

Felix Mallon, who recently obtained a small well at the corner of 235th and Eshelman, is preparing to drill another on 236th St. Plymouth Oil Co., a new organization with the old familiar name, will drill on 236th St. east of Narbonne, across the street from the Alford & Thomas well.

Important to the future of the south portion of the field are the tests being made in the Blue Bell well by C. A. Doddy & Associates. Located on 241st St. east of Pennsylvania Ave., the well was a failure in the Del Amo zone and was plugged back and recored through the Main zone. Although a formation test was inconclusive, the electric log and cores were good enough to warrant a string of pipe and 8⅝-in. casing was set at 3750 ft. and a production test is being made of the interval between that point and present bottom at 3860

LOS ANGELES BASIN WILDCATS

Area	Well	No.	Section	Depth	Status
Bellflower	Clayton, Geo. L., Scott	1	32, 3-12	6897	Idle
Castaic	Royal Land Corp.	1	8, 4-17	1120	Drilling
La Mirada	DHB Oil Co., Heath	1	34, 3-11	6150	Idle
	John McKeon and Assoc. Carmenita	1	21, 3-11	8350	Idle
Mojave	Mojave Pet. Co., Gorman	1	5, 8-18	312	Drilling
	Jennings	2	33, 5-14	150	Drilling
Newhall	Continental Oil Co., Newhall	1	20, 4-17	200	Drilling
	Newhall Drlg. Asso., Needham	4	13, 3-16	3505	Cleaning out
	Palmluck Oil Co.	1	23, 3-16		Rig
Palmdale	Antelope Valley Pet.	1	17, 6-12	900	Idle
Palos Verdes	Gene McLaren	1	27, 4-14	3992	Idle
	Rolling Hills Pet.	1	27, 4-14	5100	Idle
Pico	British Am. O. P. Co.	1	12, 3-12	6725	Drilling
San Fernando	Tide Water Assoc., Porter	1	27, 3-16	5393	Testing
Santa Monica	Texas Co., A-S	1	9, 2-15	4065	Drilling
San Pedro	Grady, R. T.	1	23, 5-14		Rig
	Hogan Pet. Co., Burkhead	1	7, 5-13	2600	Idle
Whittier	Langstaff, Geo. W., Iliff	1	8, 2-11	2250	Idle
	Orange County				
Bolsa Chica	New Fields Oil Co.	1	16, 5-11	3200	Drilling
Costa Mesa	A. V. Oil & Gas Co.	1	16, 6-10	4751	Testing
	San Bernardino				
Chino	So. Counties Pet. & Drlg. Co.	1	26, 2-8	2250	Drilling
	San Diego County				
Carlsbad	Dauphin Dev. Co.	1	16, 12-4	625	Drilling

ft. Should the old horizon be commercially productive this far south, a new drilling boom may be expected.

MacDonald & Burns, whose operations have been among the most successful, completed well No. 11 on the Moore lease flowing 160 bbls. on initial gauges. Last reported production was 120 bbls. of 26.3 gravity oil.

West of the former Hot Spot, Standard Oil Co. completed two wells and is drilling three more. Marble No. 1-14 was finished with 200 ft. open to bottom at 4985 ft. flowing initially 525 bbls. of 25.5 gravity oil cutting 2.5%. Marble No. 2-8 took 150 ft. of zone and was brought in with a maximum yield of 295 bbls. cutting 5%.

Lancia Oil Co. completed well No. 1 at the corner of 235th and Pennsylvania Ave. for 230 bbls., clean. 190 ft. of formation was taken. Other small wells were Kovell Oil Co. No. 4, Kerben Oil Co. No. 1, Albert Douglas No. 1 and Elexico Oil Co. Airey No. 4.

Huntington Beach In Revival Period

Huntington Beach, first of the famous boom fields which flourished during the 1920s, appears definitely headed for another of its periodic revivals. Active only in a routine manner since the subsidence of the "crooked hole" campaign a few years ago, the field is staging a comeback with two distinct areas vieing for the spotlight.

North of Ocean Blvd. and west of 23rd St., Southwest Exploration Co., a combination of Hancock and Signal Oil companies, has started work on the first two of 87 wells to be eventually drilled under the state-owned tidelands, while in the Five Points area, northeast of the old field, J. E. F. Oil Co. and Apex Petroleum Co. are preparing to drill new wells. Many observers believe that wells larger than the present two 100 bbl. pumpers may be obtained in the latter area.

On the flats east of the city, Bishop Oil Co. is planning some new development near the old Standard Oil Co. Surf lease.

Tidewater Porter 1 Tests For Production

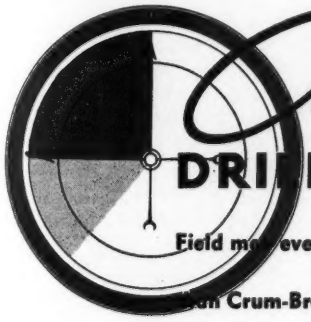
Porter No. 1, Tide Water Associated Co. wildcat in Aliso Canyon west of San Fernando, is making a third series of production tests. Fair oil sand is said to have been cored from 4800 ft. to 5370 ft. and the hole has been plugged back 30 ft. from bottom at 5393 ft. A string of 6⅝-in. casing is cemented at 4795 ft. When last reported a perforated liner had been landed and the well was being swabbed with fluid at 1200 ft., showing a little oil.

Richfield Starts Dominguez Test

Work has been started by Richfield Oil Corp. on what should be one of the most interesting exploratory wells in the Los Angeles Basin. Southeast of Dominguez and north of a line drawn from that field to the northwest extension of Long Beach, concrete foundations are being poured for Dominguez No. 1. It is understood the site was chosen after an extensive seismographic survey.

De Soto Test Now Signal Hills Deepest

Passing the former record of 9280 ft. held by Shell Oil Co., Nesa No. 11, De Soto Oil Co. well No. 1 is now the deepest hole in the Signal Hill-Long Beach field. Last reported bottom was 9300 ft. in brown shale with thin streaks of oil sand.



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Completions Hold Wilmington Interest

With the development of tidelands and the harbor channels temporarily held up by legal uncertainties, the chief center of interest in Wilmington was the large number of completions.

Continuing with its development near the Long Beach municipal gas holder, Allied Petroleum Co. completed well No. 29 flowing nearly 300 bbls. from the Ranger zone. After setting an 8⅝ in. water string at 3080 ft., hole was bottomed at 3360 ft. and the well brought in as a clean, 16 gravity producer. The good results so far obtained by Allied should lead to further development in this as yet neglected portion of the field.

Only one Ford zone well was finished, General Petroleum's Flint No. 1, located at Pioneer and "E" Streets in the Wilmington central townlot district. An old producer, hole was deepened from 3500 ft. to 5670 ft. where 5¾ in. casing, including 120 ft. perforated on bottom, was landed and cemented at 5550 ft. The pipe was then gun perforated at intervals below 5100 ft. and the well swabbed in as a 200 bbl. producer of 29 gravity oil cutting 3.5%.

Producing a 55 ft. section of the Terminal zone and all the Ranger, Hollywood Oil Co. finished its fourth well on the Baxter lease flowing at the initial rate of 500 bbls. of clean oil. Located near Channel No. 2, west of a southerly projection of Santa Fe Ave., the hole is open in the top zone from 2725 to 3040 ft. and from 3640 ft. to bottom at 3695 ft. in the upper Terminal horizon.

Three Ranger zone wells were completed by Richfield Oil Corp. on its large Pacific Dock & Terminal Co. lease. Largest of the group was No. 14 which, bottomed at 3005 ft., flowed initially over 500 bbls. a day from 280 ft. of formation. Numbers 15 and 17, bottomed respectively at 3085 and 3295 ft., each flowed 340 bbls. Pacific Dock No. 13 penetrated both the Ranger and upper Terminal zones and was finished at 3670 ft., flowing 482 bbls. of 16.8 gravity clean oil through a 19/64 in. bean.

Three wells were finished in the faulted Terminal zone discovered by Allied Petroleum Co., well No. 22, south of Ocean Blvd. Superior Oil Co., Seaside School No. 1, located on Riverside Ave., with the Terminal zone open at intervals from 3485 ft. to bottom at 3920 ft., and perforations in the Ranger from 2520 to 2890 ft., was brought in with lower zone production gauging 675 bbls. through a 24/64 in. bean and upper production gauging 750 bbls. through a 1 in. bean. General Petroleum's Harbor Comm. No. 19, on the east side of San Diego Ave., flowed 450 bbls. in seven hours from the Terminal zone and 365 bbls. from the Ranger. Perforations are open from 2526 to 2920 ft. and from 3600 ft. to bottom at 4060 ft. On the northwest corner of Seaside Blvd. and Santa Clara Ave., Harbor Comm. No. 20 was finished at 4040 ft. flowing 700 bbls. of 27.5 gravity lower Terminal oil.

Holding the initial flow to as near 400 bbls. as possible, Union Pacific Railroad completed No. 92 in the Terminal zones. Perforated intervals are from 2945 ft. to bottom at 3971 ft.

Although only seven wells were actively drilling on a recent count, several are being completed and at least half a dozen new projects are preparing to drill. Union Pacific Railroad finished its gas injection well, No. A, at 3175 ft., after setting 6⅝ in. water string at 2900 ft. The well will be flowed for a time before repressuring is started.

Richfield Extends Harbor City Area

Extending the Harbor City area of the Torrance field 2000 ft. to the south and east, Richfield Oil Corp. obtained a 220 bbl. flow in completing its Spring No. 1 located near the intersection of "Q" St. and Figueroa. With bottom at 5202 ft. and casing set at 5139 ft., a perforated liner was landed on bottom and the well swabbed in flowing clean 29.5 gravity oil. The company has announced locations for Capitol No. 1 and Stone No. 1 in the same vicinity.

At the corner of Lomita Blvd. and Figueroa, Sierra Trading Corp., Sierra Spring No. 1, is gun perforating 7 in. casing cemented on bottom at 5300 ft. Only stringers of oil sand were cored in this well.

Seeking to extend deep production to the west, Riviera Petroleum Co., a Bass & Goodknight organization, is preparing to drill in the northwest corner of lot "E" of the Rancho Palos Verdes subdivision, offsetting the old Bishop & Smith well.

Ring Oil Co., most aggressive operator in the field, now has four wells on production and is drilling its fifth. Also recently brought in were Ring-Hawkins No. 2, finished barefoot for 350 bbls. and No. 3 on the same lease, flowing at the estimated rate of 465 bbls. Located near the corner of Lomita Blvd. and Normandie, both wells produce 30 gravity clean oil.

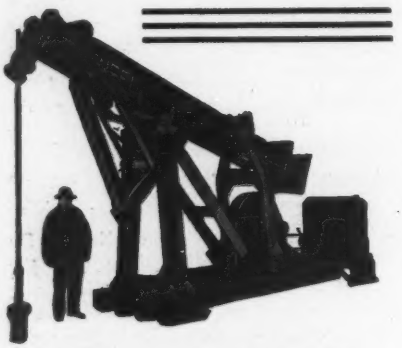
Mahar No. 1, located at the corner of Leonardo and Frampton, proved to be one of the best wells yet completed, flowing initially 650 bbls. of clean crude from the interval 5109-5265 ft.

Using the famous Superior Oil Co. drilling technique, Ring Oil Co. is establishing remarkable speed records, finishing its wells at 5270 ft. in about 18 days.

California Star Oil Co. brought in its third well, Anderson Comm. No. 1, at the intersection of 251st and Petroleum flowing 350 bbls. of clean oil. Hole was bottomed at 5290 ft. and water string set at 5136 ft.

Pushing proven limits a little to the west, Bandini Petroleum Co. bottomed Harbor Development No. 1 at 5260 ft. and completed at the rate of 215 bbls. daily.

Century Oil Co., formerly called



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Bachmann Petroleum Co., finished Howery No. 1 at 5300 ft. obtaining an estimated initial yield of 275 bbls.

On the Pacific Electric right-of-way, Severns Drilling Co. is completing its first well from a depth of 5275 ft.

Several newcomers broke into the producing column during the past few days. The Caminol Co., Ltd., finished Torrance No. 2-12 at 5317 ft. with an initial of 250 bbls. and moved equipment to No. 3-14. Wilton Oil Co.'s first extension area well, No. 6, located on the northwest corner of Lomita and Frampton, was completed at 5298 ft. with an initial of 375 bbls.

Macson Oil Co. obtained 345 bbls. from its No. 1589-1-1 which was drilled to 5256 ft. Padran Oil Corp. bottomed McEwen No. 1 at 5304 ft. and after setting casing at 5165 ft., swabbing the well in flowing an estimated 200 bbls. cutting 30%. Located at the corner of 253rd and Petroleum, this is the southernmost producer in the field.

A. N. Macrate, who holds several leases scattered from Dodge St. on the east to Belleporte on the west, is preparing to complete Kupfer No. 1 and is drilling Holden No. 1 at 3500 ft.

As a cooperative effort of several operators, D & B Oil Co.'s Dawn No. 2, located on 255th St. south of the limits of Del Amo zone production, was carried down as a test of the schist possibilities. At 6368 ft., drilling was stopped in conglomerate and the hole plugged to 6320 ft. where the well flowed sulfur water through a formation tester.

R. R. Bush Oil Co., Torino No. 1, located on Frampton Ave., and the most northerly well in the new development, failed to find productive sands and was suspended at 5575 ft.

Lower Sixth Good at W. Montebello

Starting a parade of lower Sixth zone completions, Union Oil Co. obtained a 1586 bbl. oil flow from Howard & Smith No. 3, bottomed at 6385 ft. Only the lower 65 ft. of hole is open. Immediately following, Standard Oil Co. made a favorable formation test from 6410 to 6470 ft. in Braun No. 3, completing a few days later with a yield of 1000 bbls. Herley-Kelley deepened Burke No. 1 to 6433 ft. and with the hole open below the shoe of the casing at 6355 ft., swabbed in for 1100 bbls. of 35 gravity clean oil. Masser No. 1, a small producer, was killed to deepen from 6250 ft. Utilizing the lower 75 ft. of hole, McVicar & Rood recompleted Manz No. 2 at 6410 ft. flowing 1050 bbls. cutting 1.0%.

After obtaining only a small yield from 6240 ft., Montebello Wesco, Inc. deepened its No. 1 to 6458 ft. where a 5½ in. liner was landed and cemented through perforations at 6400 ft. First gauges indicated an 800 bbl. producer.

Seemingly on the wrong side of a fault, St. Helens Petroleum Co. Taylor No. 2 has not shown much encouragement in the Fifth zone. Formation tests with bottom at 5300 and 5600 ft. recovered only oily water and mud.

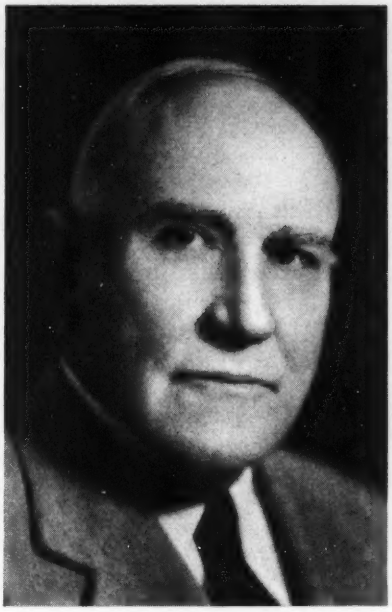
Several wells are due for completion within a few days. Standard Oil Co. is recementing casing in Harvey No. 3 after bottoming at 6395 ft. and is drilling Kaufman Fee No. 1 near the 6400 ft. level. Pongratz Petroleum Co. Martin No. 1 is reported ready to set casing, and Montebello Reservoir Oil Co. is below 6000 ft.

Hope for a southwest extension of production was seen in oil sand streaks found in Hathaway Oil Co.'s outpost well on Beverly Blvd. A fair sand body was cored near 6700 ft. beneath which was gray sand to approximately 7000 ft. where oil sand streaks began to reappear.

Shallowest drilling well in the field at present is Union Oil Co.'s Paul Howard No. 3, last reported in the hard conglomerate at 4650 ft.

Taylor Heads Union As St. Clair Resigns

At the regular October meeting of the board of directors of Union Oil Co. of California, L. P. St. Clair, for eight years president of the corporation, asked to be relieved of his presidential duties.



L. P. St. Clair

L. P. St. Clair, for eight years president of Union Oil Company, who has been elected chairman of the board of directors.

Mr. St. Clair was then elected chairman of the board of directors and in that capacity will continue actively in the affairs of the organization. Reese H. Taylor was elected as his successor.

Always a valiant champion of the small producer of oil, Mr. St. Clair was one of the organizers of the Independent Oil Producers Agency and has been its president for more than thirty-one years. During the war he served as a member of the Pacific Coast War Service Committee and later helped to organize the American Petroleum Institute, acting as vice president at large for several years.

He identified himself with the Union Oil Company in 1909 and has been a director since 1920. He was elected vice president two years later and became the fifth president of the corporation following the death of Mr. W. L. Stewart in 1930.

Reese H. Taylor

Reese H. Taylor, new president of Union Oil Company. A member of Union's board of directors since 1937.

Mr. Taylor was elected to the board of directors of Union Oil Company in 1937 and has had varied experience with other business concerns. He is president of the Consolidated Steel Corporation Ltd.; also a director of Pacific Finance Company; Douglas Aircraft Corporation, Pacific Indemnity Company and Gladding McBean and Company. He is at present a director of the Federal Reserve Bank of San Francisco.

No other changes in organization were made.

San Joaquin Valley

Tide Water, Texaco Gatchell Failures

Definitely limiting the extension of production to the northwest of the discovery area, Tide Water Associated Oil Co., Guardian No. 66, located near the center of the southeast quarter of sec. 12, 20-15, cored only hard, gray siltstone from the Glauconitic marker to the top of the Moreno (Cretaceous) at 7175 ft. The project has been abandoned at 7200 ft.

After failing to recover more than a few barrels from the depleted upper Temblor zones, The Texas Co. indefinitely suspended operations in Mohawk No. 19, located in the northwest quarter of sec. 12. Prospects for this well dimmed when Universal Consolidated Oil Co., Leavitt-Hintze No. 1 found no Gatchell sand and the last vestige of hope was lost when the zone was not encountered by Tide Water Associated.

Following a conservative policy of drilling only required offsets, Petroleum Securities Co. has two wells approaching final depths. No. 31-18F, one location east of No. 1-18F (Gatchell No. 2), is drilling below 6300 ft. after coring the top of the Kreyenhagen shale at 5740 ft., an even hundred feet lower than its neighbor and 40 ft. lower than Superior Oil Co.'s Coalinga Fee No. 1, an offset to the north. No. 88-7F, offsetting Superior's Hight No. 1, is making hole below 6850 ft.

Standard Oil Co. No. 82-13C, a southwesterly offset to the discovery well, is preparing to complete at 7112 ft. after having cored a total of 326 ft. of the rich "brown sugar" oil sand. The last 14 ft. above bottom, however, was shaley gray sand and apparently unproductive.

Standard is preparing to drill No. 1-17F offsetting Petroleum Securities No. 88-7F and Superior Hight No. 1. A third Standard location has been staked 330 ft. south and 990 ft. west of the northeast corner of sec. 13. A well drilled at this point should furnish valuable information as to the westerly extent of the Gatchell sand, and may help to explain why No. 82-13C is higher structurally than wells to the north and east.

One location north of the producer Grimes 88-12C, Petroleum Securities Co., has made a location for No. 86-12C while work has been started on No. 37-7F in sec. 7 and No. 71-18F in sec. 18.

In sec. 10, 20-15, Medford Oil Co. abandoned F. C. Goetz No. 1 after plugging bottom from 6763 ft. to 6275 ft. and making a formation test. No Gatchell sand was found by this project.

Superior Oil Co. is preparing to complete Coalinga Fee No. 1, sec. 7, 20-16, after the well made a strong clean oil flow on test of 9⅝ in. casing cemented at 6830 ft. Location has been graded for No. 2 on the same property.

North of the proved area, Tide Water Associated Oil Co.'s Fleishacker No. 57-1, sec. 1, 19-15, is drilling in hard shale near the 6000 ft. level.

Very little is yet known regarding productive limits of the field, the assumption being that the control on the north and west is an Eocene shoreline against which the Gatchell sand buttresses while limits on the other sides will be found where formation fluid changes from oil to water.

Continental Wasco Tests Disappointing

Disappointing so far are tests made by Continental Oil Co. in two deep wells at Wasco. KCL No. A-3 in sec. 8, 27-24, located north of the 15,004 ft. discovery well, flowed salt water on a production test from 13,211 to bottom at 13,644 ft. and again after plugging to 13,221 ft. It is now planned to perforate the 5 in. liner between 13,140 and 13,170 ft., the interval which showed up best on the electric log.

Southeast of the discovery area, Continental's Seaboard-Associated C-1, located in sec. 26, 27-24, cored to 13,064 ft. and lost the lower portion of the hole due to a fishing job. Plugged to 9410 ft., the interval below the casing shoe at 9148 ft. tested wet and the hole was again plugged and the casing perforated from 6636 to 6809 ft. A swabbing test resulted only in the recovery of water and it is probable that the well will be abandoned.

Although the top of sand has not been reported to 13,085 ft., Standard Oil Co.'s Mushrush No. 1, located in sec. 7 and an offset to Continental's A-2, should soon be in the pay and seems to have every prospect of making a good well. KCL 8-B-1 in sec. 17 has cored stringers of oil sand but is yet very much in the semi-wildcat class.

Buena Vista Well Drilling Below 9200

KCL F-1, second deep test of the Ohio Oil Co. near Buena Vista Lake, is now reaching critical depths below 9200 ft. Located in sec. 10, 31-25, the well is approximately six miles northwest of the Buena Vista gas field where Ohio recently suspended operations in KCL A-8 after drilling to 11,186 ft.

Union, Superior Get Rio Bravo Producers

Union Oil Company has completed its fourth well in the Rio Bravo field it discovered last year, placing Kernco No. 5-34 well on production flowing at the rate of 2500 barrels of clean oil per day through a 24/64 inch bean. Gravity of the crude was about 36 degrees and 2,058,000 cubic feet of gas came with the flow. Casing pressure was 1900 pounds; tubing pressure 2000 pounds. Kernco No. 5-34 was bottomed at 11,500 feet with casing set at 11,215 feet.

Union has two other drilling jobs in this field. Kernco No. 2-34 has set 7-inch casing at 11,205 feet and is preparing to penetrate the producing horizon. Kernco No. 6-34 is drilling ahead at 10,957 feet.

Ruhl No. 2, southeasterly outpost in sec. 1, 29-25, was complete by Superior Oil Co. flowing better than 1000 bbls. through a 24/64 in. bean. The well was finished barefoot at 11,523 ft. after setting casing at 11,475 ft. Ruhl No. 3 is drilling below 10,000 ft.

General Petroleum Corp. Wagner No. 3 is making hole below 6000 ft. while Van Ness No. 4 and Geo. F. Getty's Ramsey No. B-3 are both in excess of 10,300 ft.

Richfield Gets Oil In Two Wildcats

Coring oil sand from 8285 ft. to bottom at 8315 ft., Richfield Oil Corp. Tupman-Western No. 1, exploratory well located a mile east of Elk Hills, became the hottest wildcat in the Valley. The hole is being conditioned to run a formation tester.

Almost the same day as the Tupman-Western strike, Richfield's KCL No. 1, Wheeler Ridge edge project in sec. 28, 11-20, cored a semi-saturated sand from 7730 to 7795 ft. A formation test will be made before drilling is resumed.

Richfield is drilling Union Avenue No. 1 below 7000 ft. in sandy shale.

Hogan Wharton 10 Only Mt. View Driller

Only active drilling well in the Mountain View field is Hogan Petroleum Co. Wharton No. 10. Now coring below 4900 ft.. a test of unsaturated sands in the Nichols zone between 4820 and 4875 ft. resulted only in the recovery of three stands of gassy mud.

Remedial work in P. H. Greer's Perrel No. 2 has been delayed by losing a string of tubing in the hole.

Standard Oil Cores Rio Bravo at Greeley

Fleishauer Community No. 2 became the second Standard Oil Co. well to reach the Rio Bravo oil sand in the Greeley field when the zone was picked up in a core at 11,560 ft. With bottom at 11,585 ft., an electric log was run to better determine the quality of the showings. The zone was topped approximately 150 ft. lower than in KCL 11-2, located three quarters of a mile to the northwest.

Coring hard gray shale, probably Kreyenhagen, below 12,375 ft., Superior Oil Co. Krause No. 1 found the Rio Bravo horizon barren and is apparently going on down in search of new sands.

California Lands Wells Reaches Critical Depth

California Lands, Inc., operating subsidiary of Bank of America, is drilling two of the most interesting tests of the San Joaquin valley floor. Immediately west of the Lost Hills field in sec. 24, 26-20, Occidental No. 1 is coring sandy shale below 7340 ft. and though no oil sands have been noted below the Temblor zones, considerable gas is in evidence.

Salisbury No. 1, deep test of the Buttonwillow area in sec. 7, 29-24, is drilling ahead near 6000 ft. after shutting off the high pressure gas with protection casing at 5297 ft. Both wells were located after a thorough geological study and each is considered to have excellent chances of uncovering productive sands.

Two Tests Drilling East of Edison Field

Seeking shallow production, two independent wildcats are drilling in the foothill area east of the Edison field. In sec. 33, 29-30, the George W. Johnson well is reported in hard sand below 1350 ft. while to the south in sec. 27, 30-30, G. E. Renner was last reported at 1825 ft.

Meridian Oil Deepens In Fruitvale Field

Deepening Fee No. 3 from 3134 ft. to 3670 ft., Meridian Oil Co. obtained a yield of 89 bbls. of 22 gravity oil cutting 1.0%. A 6⅝ in. liner, 765 ft. in length and containing 122 ft. perforated, was landed on bottom and cemented through perforations at 3544 ft. The well is located near the center of the northwest quarter of sec. 23, 29-27.

Finishing for the time being its development in sec. 14, Western Gulf Oil Co. completed KCL B-39 pumping 150 bbls. of clean oil from a total depth of 3896 ft.

Petrol Drills Deep Grapevine Area Test

Determined to thoroughly test the possibilities of the Grapevine area, The Petrol Corp. is drilling below 6230 ft. in Reserve-Petrol No. 33-5, sec. 33, 11-19. Although no new oil sands have been uncovered below the 4600 ft. zone, observers believe the geology favorable for the accumulation of oil in lower horizons.

Tide Water Associated Oil Co. has derrick up for S. P. No. 2 in sec. 15, 11-19.

Newest Operations In Oldest Valley Area

Kern River field, oldest in the Bakersfield area, has recently been the scene of about a dozen new completions, all by Helm & Smith and the Hast Oil Co. Using a portable spudder type drilling rig, only a few days are required to attain the average completion depth of 675 ft. A string of 8⅝ in. casing is cemented over the shallow sand at 475 ft. and the wells finished with a 6⅝ in. perforated liner on bottom. Production, though usually less than 10 bbls. per well, is consistent, and as many can be pumped from a central jack plant, lifting costs are low. Activity has been confined to section 34, 28-28 until recently when Alfred Furhman spudded in his well No. 13 in sec. 28.

East Side Tests Prove Failures

Pioneer Petrol Corp., Buchner No. 1, located near the center of the southeast quarter of the northwest quarter of sec. 20, 26-28, was abandoned at 1775 ft. after coring the top of the barren Vedder sand at 1722 ft.

In sec. 26, 26-28, Tarr & McComb

SAN JOAQUIN VALLEY WILDCATS

Area	Well	No.	Section	Depth	Status
Fresno County					
Coalinga	Shell Oil Co., Coast Range	21	17, 19-15	2244	Testing
	Stuart Oil Co., Stuart	1	12, 21-14	475	Drilling
	Tide Water Assoc. Oil Co., Fleishacker	1	1, 19-15	5880	Drilling
E. Coalinga	Pure Oil Co., SPL	1	31, 18-17	12336	Abandoned
Clovis	Central Valley Oil Co.	1	1, 12-20	608	Idle
Jacalitos Hills	Dauphin Dev., Ragan	1	30, 21-14	3800	Drilling
Mendota	Pierce, Cyrus, Shorb	1	16, 14-12	1020	Drilling
Kern County					
Belridge	General Pet. Corp., St. Helen	2	12, 28-20	968	Testing
Buena Vista	Ohio Oil Co., KCL	A-8	32, 31-26	11186	Idle
		F-1	10, 31-25	9210	Drilling
Buttonwillow	Calif. Lands, Inc., Salisbury	1	7, 29-24	5920	Drilling
Canal	Shell Oil Co., KCL	B-87	4, 30-25	8630	Drilling
Devils Den	Gibson Oil Co., Alferitz	3	14, 25-18	1230	Testing
	Goodrum, Geo., Baron	1	24, 25-18	1210	Idle
Dominion	Master Pet. Co., U. S.	1	34, 26-28	825	Idle
Edison	Johnson G. W.	B-P 1	33, 29-30	1325	Drilling
Elk Hills	Renner & R.H.L. Oil Co.	1	27, 30-30	1600	Drilling
	Richfield Oil Corp. KCL-W	1	32, 30-25	8315	Testing
Famosa	Shell Oil Co., KCL	A-58-8	8, 27-26	5303	Drilling
Fruitvale	The Texas Co., C.W.L.	1	7, 29-27	10122	Redrilling
Grapevine	Hall-Baker Co., Reserve	32-2	33, 11-19	4615	Testing
	Petrol Corp., Reserve	33-5	33, 11-19	6220	Drilling
	Richfield Oil Corp.	KCL-1	28, 11-20	7796	Drilling
	Tidewater Assoc. O. Co., S.P.	2	15, 11-19		Rig
Mt. Poso	Garner Bros. Oil Co., Garner	1	6, 27-29	685	Drilling
Midway	Fried, Julius	1	34, 32-24	4520	Drilling
Poso Creek	Little & Gilstrap Keating	1	20, 27-27	2046	Pumping
	Reynolds Oil Co.	1	20, 27-27	2855	Idle
Strand	Continental Oil Co.	E-1	17, 30-26	8575	Redrilling
Union Ave.	Richfield Oil Corp., Union Ave.	1	6, 30-28	7050	Drilling
Kings County					
Alpaugh	Tri Counties Oil Co., Olson	1	10, 23-22	7769	Idle
Dudley Ridge	Falcon Oil & Gas Co.	1	24, 23-20	6500	Idle
Pyramid Hills	Pyramid Prod. Co., Retherford	1	27, 24-18	3090	Idle
Kettleman	Temblor Oil Co., Bunting	1	25, 23-18	9138	Plug 7815—Idle
Tulare Lake	Irvine, Athalie	1	11, 24-20	2210	Idle
Tulare County					
Alpaugh	Sullivan & Youngdahl	1	33, 23-23	2732	Idle
Ducor	Nelson & Davison	1	1, 24-27	1440	Idle
Trico	Caminol Co., A. O. G.	3	29, 24-24	9641	Abandoned

abandoned Stockton No. 1 at 1375 ft.

Honolulu Oil Corp. abandoned well No. 74, sec. 18, 28-29, at 1838 ft. when both the Jewett and the Vedder zones proved wet.

East of Mount Poso in sec. 6, 27-29, Garner Bros. Oil Co. is drilling in an attempt to develop Vedder zone production.

In the Poso Creek area, Little & Gilstrap obtained 40 bbls. a day from Keating No. 1, completed at 2046 ft. in sec. 20, 27-27.

Shell Drills Two Deep Valley Tests

Shell Oil Co., which more than two years ago discovered Ten Section, the first deep valley floor yield, is yet one of the most active companies in exploration work. In sec. 4, 30-25, northwest of the year old Canal field, KCL No. B-87-4 is coring below 8700 ft., apparently having gone through the Stevens zone equivalent.

Continuing the search for deep production near Famosa, Shell is drilling KCL A-58-8 below 5400 ft. in sec. 8, 27-26. Located comparatively close to the eastern side of the valley, the well should encounter the Vedder zone at relatively shallow depths.

Coastal District

Santa Maria Field Prices Are Restored

With the restoration of former price levels and the resumption of buying on the part of the Union Oil Co., activity in the Santa Maria Valley field is again on the increase.

Fred E. Cole, Santa Barbara independent operator, spudded in his well No. 18 located in the northeast corner lot 5 of the Paderewski subdivision and E. B. Kenny of Los Angeles is preparing to drill on the Wilcox property in sec. 27, 10-34. R. R. Bush Oil Co. with Hancock Oil Co. is drilling Bradley Lands No. 4 below 4350 ft. in sec. 26.

After several lean months, independent operators are enjoying a period of comparative prosperity. Total field production is now averaging about 15,000 bbls. daily at the increased price as against a low of 1800 bbls. at $.45 per bbl. during August.

For any crude oil which Union Oil Co. of California buys in the Santa Maria field, it will pay the following prices per barrel at the well, effective 7 a.m., October 15, 1938.

Gravity	Per Barrel
13.0 to 13.9	63 cents
14.0 to 14.9	65 cents
15.0 to 15.9	68 cents
16.0 to 16.9	70 cents
17.0 and above	70 cents

Ventura Outpost Cores Oil Sand

With much oil sand cored in the last 500 ft. Lloyd Corp.'s second test of the east plunge of the Ventura Avenue structure begins to look like a sure bet to extend the field. At last reported depth of 6880 ft., the sand streaks appeared to be thickening and of better saturation.

Tide Water Associated Oil Co. leads in activity with nine projects. Most interesting of the lot is McGonigle No. 11 which was completed at 10,935 ft. as the deepest well in the field. Initial pro-

NORTHERN COUNTIES WILDCATS

County	Well	No.	Section	Depth	Status
Colusa	Amerada Pet. Co.,Calif. Lands	1	34, 16-1	7589	Drilling
Glenn	Ohio Oil Co., Willard	2	18, 20-2	2253	Drilling
Humboldt	Texas Co., Eureka	2	22, 3-1	7708	Redrilled 4864 Testing
Madera	Barnhart-Morrow, Arnold	1	22, 10-17	3190	Abandoned
Monterey	The Texas Co., Lewis	1	1, 19-5	3929	Drilling
	Anderson, A. A., Hillman	1	15, 24-14	4004	Cleaning out
	Tannehill, L. B., Quinn	1	35, 20-8	1435	Drilling
Sacramento	Superior Oil Co., R. B.	1	7, 3-3	3275	Drilling
San Mateo	Wilshire Oil Co., Cowell	2	20, 6-5	1605	Testing
Solano	Richfield Oil Corp., Potrero	1	10, 4-1	5175	Drilling
Stanislaus	Orestimba Oil Co.	1	12, 7-7	790	Idle

COASTAL COUNTIES WILDCATS

Area	Well	No.	Section	Depth	Status
Santa Barbara County					
Carreaga	Douglas-Stratton Oil Co.	1	8, 8-33	6240	Idle
Foxen Canyon	Richfield Oil Corp., Tinaquaic	1	36, 9-32	650	Drilling
Gaviota	Gaviota Oil Co., Hollister	1	35, 5-33	3215	Idle
Gato Ridge	Barnsdall Oil Co., Mag.	5	9, 8-32	3035	Idle
	Pezzoni	1	15, 8-32	4150	Drilling
Lompoc	O'Donnell, J. E., Helen	1	8, 7-33	4925	Drilling
Los Olivos	Continental Oil Co., Laguna	2	25, 8-31	3860	Drilling
	General Pet. Corp., La Laguna	1	6, 7-30	2880	Drilling
	Laguna Western, Bradley	1	15, 7-30	3279	Idle
Orcutt	Warren Deuel, Garrett	1	12, 9-34		Rig
San Luis Obispo County					
Cuyama	Burch, I. L.	3	4, 10-26	250	Drilling
Edna	Loma Grande Oil Co., Lewis	1	28, 31-13	1475	Idle
Elk Horn	Calif. Pet. Prod. Co., Irons	1	19, 10-24	1710	Idle
	Lee, Harry Defiance	1	7, 32-22	225	Idle
	Western Plains Oil Co.	1	7, 31-21	4010	Idle
Huasna	Hancock O. Co.,Scherer-Dickes	1	30, 12-33	5593	Idle
Paso Robles	Vanguard Oil Co., Clark	1	26, 27-14	4950	Idle
	Epco, Inc.	1	27, 26-13	150	Drilling
Ventura County					
Ojai	High Mesa Oil Co.	1	16, 4-22	1730	Drilling
Red Mountain	Martin, J. W.	3	15, 4-21	1250	Idle
Sespe	Claran Oil Co., Hardison	1	22, 4-20	450	Drilling
	Commander Oil Co.	7-F	13, 4-19	575	Drilling
	McKinnis, Chas., Cosley	1	14, 4-19	1090	Drilling
	Merchants Pet., Cochran	8	1, 4-20	1365	Drilling
	Speik Oil Co.	1	33, 5-19	3440	Idle
	St. Louis Oil Co.	1	1, 4-20	630	Drilling
Shiells Canyon	The Texas Co., Shiells	135	4, 3-19	4026	Drilling
South Mt.	Clipper Oil Co.	1	17, 3-20		Rig
	The Texas Co., Richardson	5	13, 2-21	6702	Pumping
Tar Creek	Section 20 Oil Co.	1	20, 5-19	2240	Drilling
Timber Canyon	Stallings, Senter, Ahlberg	1	24, 4-21	1445	Testing
Ventura	Ventura Drilling Co.	1	10, 3-23	1025	Drilling

duction was 1650 bbls. of 28 gravity oil cutting 9%.

Shell Oil Co. is preparing to complete two wells. Edison No. 30 is bottomed at 7650 ft. and Taylor No. 96 finished at 8930 ft. Both wells are standing with liners cemented through perforations.

Sta. Barbara Co. Tests Near Critical Depths

The several wildcats now active in Santa Barbara county are approaching interesting depths.

In sec. 8, 7-33, Jim O'Donnell's Helen No. 1 stopped drilling at 4925 ft. and has cemented surface casing at 300 ft. Drilling is expected to be resumed immediately.

Near Los Olivos, General Petroleum Corp., La Laguna No. 1, sec. 6, 7-30, is coring hard brown shale below 2750 ft., and Continental Oil Co., La Laguna No. 2, sec. 25, 8-31, is making fast time below 3900 ft.

Latest of the group to start is Richfield Oil Corp. Tinaquaic No. 1, in sec. 36, 9-32, last reported at 650 ft.

I. L. Burch Drills In Cuyama Valley

I. L. Burch, long a believer in the potentialities of the Cuyama valley region, has spudded in a new exploratory project. Located in sec. 4, 10-26, the well, known as No. 3, is drilling with light equipment below 250 ft. Mr. Burch has drilled several other wells in the area, both under his own name and under the name of Little Cuyama Valley Oil Co.

Epco, Inc. Drills Near Union School

Epco, Inc., a Los Angeles concern affiliated with Eureka Petroleum Co., took over the old Ajax project near Union school in sec. 27, 26-13, and has set surface casing at 150 ft. The company expects to proceed with drilling immediately.

Texas, El Rancho Drill Shiells Canyon

After recovering nearly 800 ft. of clean oil on a formation test from 3950 ft., the outlook for production in Texas Co. Shiells No. 135 is definitely brighter. Previous tests at higher levels had recovered mostly mud and water. Drilling is yet in progress below 4040 ft.

El Rancho Oil Co. is preparing to drill Elkins No. 2 in the section adjoining to the south.

LATE BULLETINS

Aliso Canyon Tide Water Associated Oil Co. discovered a new field Oct. 25, when Porter No. 1 was completed flowing 1100 bbls. of 23.7 clean oil. See page 39.

On formation test of 20 ft. of oil sand cored and bottom at 7181 ft., Hathtway Oil Co. Dore No. 1 flowed oil with small amount of salt water, discovering a 7th zone in the Montebello field. See page 41.

New Work Expected At South Mountain

Following Texas Co.'s recent completion of Yale-Richardson No. 5 as an 85 bbl. pumper from 4030 ft., rumors are rife that several new wells are to be started soon in the South Mountain field by independent operators. Although production is small, it so far has shown no decline, and some are of the opinion that with more drilling, larger wells may be obtained.

Petrol Recompletes Magenheimer 5-11

After cleaning out and plugging bottom from 4714 to 4600 ft., The Petrol Corp. recently recompleted Magenheimer No. 5-11 at Gato Ridge pumping 250 bbls. of 12.5 gravity oil cutting 10%.

Barnsdall Oil Co.'s Pezzoni No. 1, located in sec. 15, 8-32,, has been delayed by twisting off drill pipe on bottom at 4150 ft. The company's Magenheimer No. 5 is yet idle at 3035 ft. awaiting the final outcome of the Petrol well.

Edna Wildcat Fails To Shut Off Water

After several cement jobs failed to shut off surface water, Loma Grande Oil Co. suspended operations in Luis No. 1, located in sec. 28, 31-13, near Edna in San Luis Obispo county. A poorly saturated tar sand was cored near bottom at 1476 ft. and 8⅝ in. casing was run to 1235 ft.

California Association Elects Group Officers

New officers of the Main Standardization Committee of the California Oil and Gas Association, elected at a meeting on October 18, are: C. W. Froome, Union Oil Company of California, chairman; L. R. Smith, Tide Water Associated Oil Company, and H. N. Marsh, General Petroleum Corporation, vice-chairman; and D. S. Kilgour, California Oil and Gas Association, secretary. Mr. Froome is also the new chairman of the California subcommittee on the Standardization of Tubular Goods of the American Petroleum Institute. The meeting was held for the purpose of discussing recommendations to be made at meetings of national standardization committees at the forthcoming A. P. I. Annual Meeting in Chicago.

Continental Grubb 9 Flows 2650 Bbls.

Flowing at the rate of 2650 bbls., Continental Oil Co. brought in Grubb No. 9 in the San Miguelito field. Bottomed at 7000 ft., and with 8⅝ in. water string set at 5615 ft., a total of 1385 ft. of productive formation is utilized. Accompanying the flow of 30.7 gravity oil was over 3,000,000 cu. ft. of gas.

Chanslor-Canfield Midway Oil Co., after bottoming Oakgrove No. 7 at 7171 ft. is preparing to test for production. Only the lower 250 ft. of hole will be produced, the liner being cemented through perforations at 6920 ft.

Division of Mines Releases New Map

A comprehensive new gological map of the State of California has just been released by the State Division of Mines. Printed with ten color plates, streams, roads, and approximately 80 geological units are plainly shown. Smaller maps show mineral locations, source, data, submarine contours, glacial features, rainfall, and a geologic time scale. Printed on six separate sheets, the assembled map covers an area 7 x 7 feet. Copies may be obtained from State of California, Department of Natural Resources, Division of Mines, Ferry Building, San Francisco. Price $4.00.

Voters of Long Beach, at a special election on October 18, defeated an initiative ordinance designed to remove restrictions to drilling near schools or hospitals in the harbor oil field and to provide for the drilling on small isolated holdings.

Tentative program for the 19th Annual Meeting in Chicago November 14 to 18, as announced on October 17, calls for the presentation of nearly 30 addresses and technical papers, reports of numerous committees, and for 75 committee meetings.

Fifty per cent cut in the present excise taxes upon all foreign oil entering the United States has been virtually decided upon by the State Department, according to reports from Washington.

LAUGH THIS OFF

Joe Dunn invited a friend over to the Polvadero Club a short time ago to try a round of the ancient and honorable pastime. The guest was just about to drive off on the opening tee when Joe cautioned, "Keep your eye on the ball." "Oh,'" snorted the other indignantly, "So that's the kind of a gang you have here!"

And on the same subject, a few of the Associated boys were cavorting around the Lakewood course a short time ago. They were discussing the various sticks, and one observant individual remarked that the driver was the longest club in the bag. "Yeah," says **Holly Hayter,** "And judging by the performance of some of your birds, it should be even longer in the bag."

Then comes our Glendale correspondent, announcing that **Glenn Bowes** was seen recently in the Verdugo Hills, with a grim look on his face, and a .22 rifle in his hand. It seems that a voracious goat had entered Glenn's backyard and gobbled up two pairs of striped pajamas for the main course, and a silk shirt for dessert. One of the Verdugo Hills is now higher by the addition of a pathetic little mound, and Glenn is smiling again, so you can draw your own conclusions. Personally we believe Glenn must have got somebody's goat.

As that great hunter, **Bill Pemberton,** always said, "The wild buffalo may be extinct, but the tame ones don't smell so good either."

"What's the idea of the crepe on the door? Is somebody dead?" asked the visitor, and the production foreman answered disgustedly, "Crepe nothing! That's the office towel."

With which few remarks we turn to **Joe Bell's** story of the superintendent who smoked Mae West cigars because, as he explained, "They had a fine shape an' drawed good."

And a nameless correspondent writes in to say that he thinks this column is very good, and very original, but he spoils the whole thing by adding, "the part which is good is not original, and the part which is original is not good."

Then there was the oil man who was sent to the dry goods store to get some knitting wool for his wife. "Do you like coarse yarns?" asked the girl, and the poor hick gurgled, "Sure, tell me some."

After all, as **Geo. McCarthy** always said, it's really the girls in the beauty parlors who make up the jokes.

We are indebted here to **Jake Nittell** for straightening out a little matter that has worried us for some time. When we heard that a Richfield rousty had been arrested for borrowing money from a friend, we couldn't believe it. Jake tells us, however, that the rousty had to knock his friend down twice before he could borrow the money, so now we understand.

And **Jack Howard** tells about one chap out at Whittier who is so badly in debt, he can't even get charged water any more.

By the way, a Whittier store advertises as follows: "Big Opening Sale. Bottle top removers—8 cents."

And **Ralph Lloyd** says the oil field story travels faster than Captain Eyeston. He declares that a yarn told in Santa Fe Springs on Monday afternoon is usually in Coalinga by Tuesday morning. Maybe Ralph's right, but that sounds like carrying a joke pretty far.

A. W. Vitt now tells us that an oil man down Huntington Beach way operates a small farm on his day off, and swears that just last week he went to town with a load of new wheat, and returned with a load of old rye.

All of which brings us to the conclusion of a rather insipid collection. Don't forget, however, that if this stuff were designed for the improvement of your mind, you would probably refuse to read it.

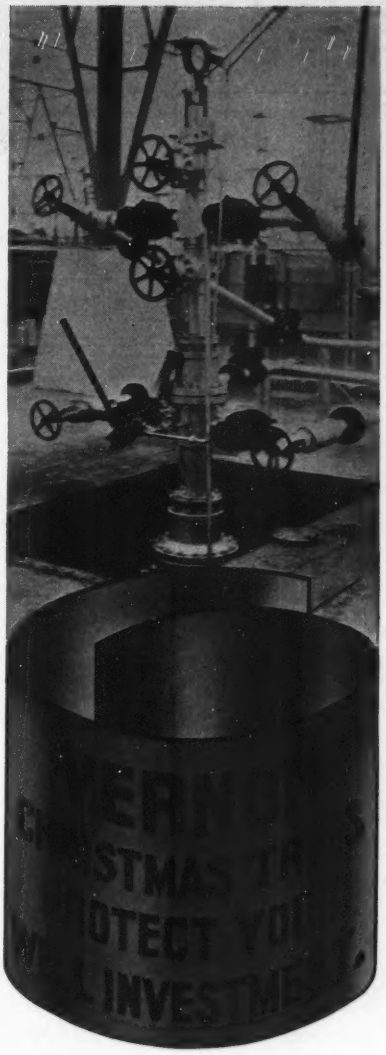
And, after all, in spite of its insipidity, it really takes brayins to write this sort of copy.

LOOK for the BAKER SECTION in the COMPOSITE CATALOG

State Drilling Report

Field	Company	Well	No.	Sec.	Twp.	Range
NEW WELLS						
Brea-Olinda	Brea Canon Oil Co.		49	2	3S	10W
Torrance	Western Talc Co.	Western	1	25	4S	14W
	Ring Oil Co., Ltd.	Ring-Hawkins	5	25	4S	14W
	Standard Oil Co.	Marble 2	9	22	4S	14W
	Standard Oil Co.	Marble 2	10	22	4S	14W
	General Petroleum Corp.	Poggi	10	25	4S	14W
	Severns Drilling Co.	P. E.	1	25	4S	14W
	J. E. Pettijohn	Koala	1	22	4S	14W
	Ring Oil Co., Ltd.	Ring-Hawkins	3 & 4	25	4S	14W
	Sunset Oil Co.	Security	T-1	25	4S	14W
Wilmington	Royalty Service Corp., Ltd.	Nelson	A-8	33	4S	13W
	Richfield Oil Corp.	Pac. Dock	30 & 31	35	4S	13W
	Union Pacific Railroad Co.	Union Pacific	95, 96 & 97	34	4S	13W
Los Angeles Co.	Mojave Petroleum Co.	Gorman	1	5	8N	18W
Long Beach	Massey & Associates	Massey & Assoc.	1	19	4S	12W
	A. S. Johnston Drlg. Corp.		35	13	4S	13W
Montebello	Union Oil Co.	Paul J. Howard	3	2	2S	12W
Coyote Hills	Graham-Loftus Oil Corp.	Perkins	2	13	3S	10W
	Shell Oil Co.	Herriman	1	22	3S	9W
Orange County	John McKeon	New Fields	1	16	5S	11W
Santa Maria Valley	Fred E. Cole	Cole	18	28	10N	34W
Kern River	Helm and Smith	Helm & Smith	9-A	34	28S	28E
	E. O. Reid		1	34	28S	28E
Round Mountain	Honolulu Oil Corp.		74	18	28S	29E
Mt. Poso	Pioneer Petrol Corp.	Pioneer Petrol Buchner	1	20	26S	28E
Greeley	Standard Oil Co.	K. C. 11	16	20	29S	26E
Coalinga	The Superior Oil Co.	Cagle	1	6	20S	16E
Newhall	Continental Oil Co.	Newhall	1	20	4N	17W
Rosecrans	Royalty Service Corp., Ltd.	Gordon	2	19	3S	13W
	Barnsdall Oil Co.	Rosecrans	10 & 11	20	3S	13W
San Luis Obispo Co.	I. Lee Burch		1	4	10N	26W
Kern County	Shell Oil Co.	KCL-A	58-8	8	27S	26E
Fruitvale	Western Gulf Oil Co.	39-KCL-B		21	29S	27E
Canal	The Ohio Oil Co.	KCL-E	9	14	30S	25E
Kettleman North	K. N. D. A.		6	16	22S	18E
	K. N. D. A.		36	18	22S	18E
DEEPEN OR REDRILL						
Torrance	W. A. Kirk		11	23	4S	14W
	Hampshire Oil Co.	Hampshire	1	23	4S	14W
	Louisiana Oil Co.	Lord	1	23	4S	14W
	Madill Oil Co.	Frenger	1	9	4S	14W
	Bass & Goodknight	Hawkins	52	25	4S	14W
Rosecarns	Sunset Oil Co.	Marine	34	7	3S	13W
Wilmington	Pacific Western Oil Corp.	Wilmington Comm.	1	33	4S	13W
Richfield	J. A. Rhea	Koffend	6	28	3S	9W
Long Beach	West American Oil Co.	W. A.	10	19	4S	12W
	Shell Oil Co.	Nesa	1	29	4S	12W
	Shell Oil Co.	Alamitos	30	29	4S	12W
	Triple H. Oil Co.	Triple H	2	29	4S	12W
	Delaney Petroleum Corp.	Signal	2	29	4S	12W
	Delaney Petroleum Corp.	Andrews	2 & 3	29	4S	12W
	Shell Oil Co.	Alamitos	3	29	4S	12W
Domingues	Selbar Oil Co.	Domingues	1	3	4S	13W
Montebello	Jack Herley & Paul L. Kelley	Burke Comm.	1	2	2S	12W
Ventura	Tidewater Assoc. Oil Co.	Lloyd	77	27	3N	23W
South Mountain	The Texas Co.	Willard	19	13	3S	20W
	The Texas Co.	Willard	22	18	3N	20W
Sespe	Colima Oil Co.		2	29	5N	19W
Midway	Standard Oil Co.		4	9	32S	24E
	Tidewater Assoc. Oil Co.		14	22	32S	23E
Mount Poso	The Texas Co.	Alta Vedder	4	4	27S	28E
Santa Maria	Union Oil Co.	Calif. Coast	12	26	9N	34W
Midway	Quality Oil Co.		2	27	32S	23E
Mountain View	Mohawk Petroleum Corp.	Hood	6	30	30S	29E
	Royalty Service Corp., Ltd.	San Joaquin	3	30	30S	29E
Kern River	Oils, Incorporated	Seven Spot	4	13	28S	27E
ABANDON						
Santa Fe Springs	Santa Fe Springs Drlg. Co.		4	6	3S	11W
	Shell Oil Co.	Thompson	1, 2 & 3	31	2S	11W
Santa Barbara Co.	S. E. Tweedy	Tweedy-Penn	1	34	5N	31W
Mt. Poso	Pioneer Petrol Corp.	Pioneer Petrol Buchner	1	20	26S	28E
Round Mountain	Honolulu Oil Corp.		74	18	28S	29E
Long Beach	N. Y. K. Oil Co.		1	29	4S	12W
Coyote Hills	Shell Oil Co.	Kiker	1	21	3S	9W
Monterey Co.	The Texas Co.	Gabilan Mesa	4	30	20S	9E
Mesa	Fred E. Cole	Cole	11	28	4N	27W
Fresno Co.	The Pure Oil Co.	S. P. L. Co.	1	31	18S	17E
Napa Co.	Stanley E. Kuhns		2 & 3	29	8N	3W
Huntington Beach	John Italiana	La Bolsa Tile	1	35	5S	11W
Montebello	Univ. Cons. Oil Co. & Richfield Oil Corp.	Estrada	1-J	5	2S	11W
El Segundo	Government Refining & Gasoline Corp., Ltd.	Ramsey-Wallace	1	12	3S	15W
Richfield	The Texas Co.	Yarnell	5	29	3S	9W

Summary	Week Ending October 15	Previous Week	To Date This Year	To Date Last Year
Total New Wells	16	25	944	1248
Total Deepened or Redrilled	13	17	631	542
Total Abandoned	10	8	405	413



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MAPS

Large map of Los Angeles Basin oil fields and map showing all California oil fields. Price $15.00 each on paper and $20 each on cloth. Individual state oil and gas maps of Mid-Continent and Rocky Mountain regions. Maps show geological cross sections at base. These maps indicate wells drilling, wells producing and abandoned, with depths.
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Oil Men's Calendar

C.N.G.A. Meeting First Thurs. Each Month.

November

1-5—American Institute of Mining & Metallurgical Engineers, Regional Meeting, Tucson, Ariz.

3-4—American Assn. of Petroleum Geologists, Pacific Section, Los Angeles, Calif.

11-17—National Motor Truck Show, Port of New York Authority Bldg., New York.

11-18—National Automobile Show, Grand Central Palace, New York.

14—Society of Automotive Engineers, Annual Dinner, Commodore Hotel, New York.

14-18—American Petroleum Institute, 19th Annual Meeting, Stevens Hotel, Chicago, Ill.

17—Industrial Marketers Assn. of So. Calif.—University Club, Los Angeles. Phone EX. 1225.

December

5-9—American Society of Mechanical Engineers, Annual Meeting, New York.

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